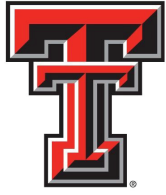


**5TH TEXAS TECH ANNUAL BIOLOGICAL SCIENCES
SYMPOSIUM (TTABSS)**



**TEXAS TECH UNIVERSITY
DEPARTMENT OF BIOLOGICAL SCIENCES
LUBBOCK, TEXAS
MARCH 28-29, 2014**

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Welcome Note:

It gives me great pleasure and honor to welcome you to the 5th Texas Tech Annual Biological Sciences Symposium (TTABSS), to be held on March 28th and 29th 2014, at the Museum of Texas Tech University. Since 2010, Texas Tech University Association of Biologists along with the Department of Biological Sciences has been organizing this symposium every year. Our main goal is to provide a platform to share scientific findings and to dig deep in the diverse and beautiful world of Biological Sciences, by exchanging ideas among our peers and earn experiences from our academic advisors. TTABSS comes to help in achieving that.

This year the symposium has a total of 150 undergraduate, graduate and faculty participation from 6 different academic institutions. Our program will have 84 research presentations that include 36 poster presentations and 4 parallel oral sessions. We count with the participation of our distinguished guest speaker Dr. Paxton Payton. He is a renowned alumnus from Texas Tech University and presenting part of his research on how to improve crop-production in water limited environments.

As a chairperson of the TTABSS committee, I would like to thank all members of the organizing team for their extreme hard work and support, our scientific advisors for their advice and suggestions on organizing the program and our event sponsors who had helped us to keep down the cost of TTABSS 2014 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 success.

Wish you all a productive and enjoyable experience!

Thiya Mukherjee.

Local Committee chairperson
President TTUAB 2013-2014.

EVENT HOSTS

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

EVENT COLLABORATORS

Association of Natural Resource Scientists (ANRS)
Department of Plant and Soil Science
CISER/HHMI
The Institute for Environmental and Human Health (TIEHH)

PARTICIPATING INSTITUTIONS

Texas Tech University
Midland College
McMurry University
Sul Ross State University
Texas Tech University Health Sciences Center
Wayland Baptist University
Universidade Federal do Rio de Janeiro

A SPECIAL NOTE

With the blessings of his wife, Heather Whitlaw, the Department of Natural Resources Management, and the Association of Natural Resource Scientists, the award for the Natural Resource Management and Conservation category has been named since 2012 the
Warren B Ballard Memorial Award

ACKNOWLEDGMENTS

If not for the support from the following individuals, TTABSS 2014 would not have been possible.

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Dr. Lauren Gollahon – Associate Professor, Biological Sciences, TTU
Dr. Boyd Butler – Assistant Professor, Biological Sciences, TTU
Dr. Mark Wallace – Chair, Natural Resources Management, TTU
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Ms. Lisa Torres – Lead Account Processor, Biological Sciences, TTU
Ms. Janie Vasquez – Sr. Business Assistant, Biological Sciences, TTU

Judges

Dr. Aysegul Balyimez - Biological Sciences, TTU
Dr. Clint Boal - Natural Resources Management, TTU
Dr. Robert Bradley - Biological Sciences, TTU
Dr. Joel Brandt - Biological Sciences, McMurry University
Dr. Boyd Butler - Biological Sciences, TTU
Dr. Lou Densmore - Biological Sciences, TTU
Dr. Lauren Gollahon - Biological Sciences, TTU
Dr. Kerry Griffis-Kyle - Natural Resources Management, TTU
Dr. Breanna Harris - Biological Sciences, TTU

Dr. Scott Holaday - Biological Sciences, TTU
 Dr. Tiffany Hopper - Biological Sciences, TTU
 Dr. Randall Jeter - Biological Sciences, TTU
 Dr. Rao Kottapalli - Center for Biotechnology and Genomics, TTU
 Dr. Nancy Layland - United States Department of Agriculture, Lubbock
 Dr. Paul Mangum - Biology Department, Midland College
 Dr. Nancy McIntyre - Biological Sciences, TTU
 Dr. Allison Pease - Natural Resources Management, TTU
 Dr. Caleb Philips - Biological Sciences, TTU
 Dr. Maria Sagot - Biological Sciences, TTU
 Dr. Jorge Salazar-Bravo - Biological Sciences, TTU
 Dr. Susan SanFrancisco - Center for Biotechnology and Genomics, TTU
 Dr. Richard Stevens - Natural Resources Management, TTU
 Dr. Zhixin Xie - Biological Sciences, TTU
 Dr. Masoud Zabet - Center for Biotechnology and Genomics, TTU
 Dr. John Zak - Biological Sciences, TTU
 Dr. Abdul Hakeem - Texas A&M Agrilife Research & Extension Center, Lubbock

Thanks to the following businesses and individuals for their contributions:

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Amresco	Walters world of pets	Stone gate golf
Labcon	Red and black	Yoga Bean
Troemner	Thai pepper	Mr. Jacob Eveland
Ms. Corienne Wagner		



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Award Banquet

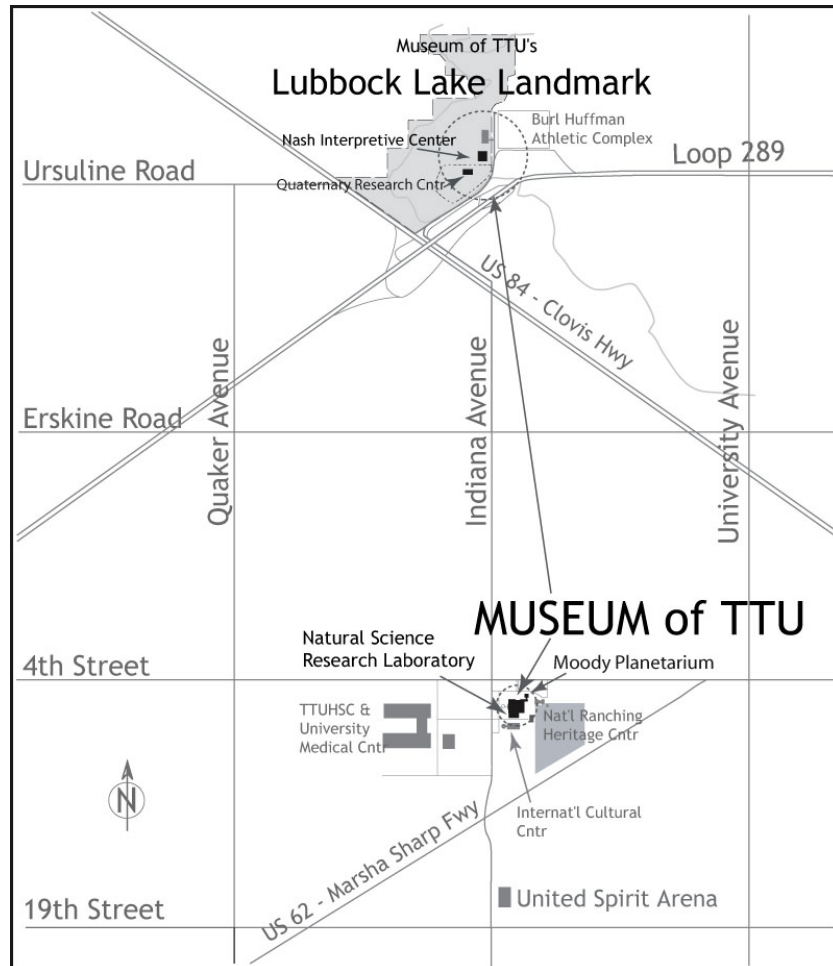
Sarah Fumagalli

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EVENT LOCATION

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)

Name	Address	Phone
Bar PM	1211 University Avenue	(806) 747-2720
Chili's Grill & Bar	607 University Avenue	(806) 744-2025
Chimy's Cerveceria	2417 Broadway	(806) 763-7369
Cricket's Grill & Draft House	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 & Bar	2419 Broadway	(806) 744-9277
One Guy from Italy's Pizza	1101 University Avenue	(806) 747-1226
Raising Canes Chicken Fingers	907 University Avenue	(806) 744-8552
Rocky LaRues	2420 Broadway #B	(806) 747-6366
Ruby Tequila's Mexican Kitchen	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 Superior Sandwich	1021 University Avenue	(806) 472-9424

DRIVING DISTANCE (INSIDE LOOP 289)

Name	Address	Phone
Arby's	2422 19th Street, Suite 6037	(806) 744-2535
Burger King	2405 19th Street	(806) 762-2282
Café J	2605 19th Street	(806) 741-5400
Fuzzy's Taco Shop	2102 Broadway	(806) 740-8226
Great Wall Restaurant	1625 University Avenue	(806) 747-1264
IHOP Restaurant	1627 University Avenue	(806) 744-5153
Josie's Authentic Mexican Food	2332 19th Street	(806) 796-0192
Long John Silver's	2344 19th Steet	(806) 765-7339
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
Schlotsky'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

Texas Tech Annual Biological Sciences Symposium 5th Annual Meeting

28-29 March 2014

Venue: Museum of Texas Tech University

3301 4th Street

Lubbock, TX 79415

PROGRAM AT A GLANCE

March 28th, Friday

- 5:30 pm – 8:00 pm** Registration – Helen DeVitt Jones Sculpture Court
- 6:00 pm – 6:10 pm** TTABSS 2014 kick off by Dr. Boyd Butler, Faculty Advisor, TTUAB 2013-14.
- 6:00 pm – 9:00 pm** Opening Mixer & Vendor Show – Helen DeVitt Jones Sculpture court
- 6:00 pm – 7:30 pm** Poster Session– Helen DeVitt Jones Sculpture Court
(Poster Hanging 5:30 – 6:00 pm)
(Poster Judging 6:30 – 7:30 pm)

March 29th, Saturday

- 08:00 am – 11:30 am** Registration – Helen DeVitt Jones Sculpture Court
- 08:00 am – 09:00 am** Breakfast – Helen DeVitt Jones Sculpture Court
- 08:40 am – 08:50 am** Welcome – Dr. Lou Densmore, Chairman, Dept. of Biology, TTU
Helen DeVitt Jones Auditorium
- 09:00 am – 10:00 am** Plenary talk – Dr. Paxton Payton
- 10:00 am – 10:15 am** Coffee break – Helen DeVitt Jones Sculpture Court
- 10:15 am – 11:15 am** Oral Presentations – Green room, Kline room, Memorial room and Helen DeVitt Jones Auditorium
- 11:15 am – 11:30 am** Coffee break - Helen DeVitt Jones Sculpture Court
- 11:30 am – 12:00 pm** Oral Presentations – Green room, Kline room and Helen DeVitt Jones Auditorium
- 12:00 pm – 01:30 pm** Lunch (On Your Own)

- 01:30 pm – 02:30 pm** Oral Presentations – Green room, Kline room, Memorial room and Helen DeVitt Jones Auditorium
- 02:30 pm – 02:45 pm** Coffee break – Helen DeVitt Jones Sculpture Court
- 02:45 pm – 04:15 pm** Oral Presentations – Green room, Kline room, and Helen DeVitt Jones Auditorium
- 04:15 pm – 06:30 pm** Break (On Your Own)
- 06:30 pm – 09:00 pm** Collections & Exhibit Viewing (Silent Auction)
Helen DeVitt Jones Sculpture Court
- 07:00pm – 09:00 pm** Awards Banquet – Helen DeVitt Jones Sculpture Court

DETAILED SCHEDULE OF EVENTS
FRIDAY, MARCH 28th

REGISTRATION

5:30 – 8:00 PM

Helen DeVitt Jones Sculpture Court

OPENING MIXER & VENDOR SHOW

6:00 – 9:00 PM

Helen DeVitt Jones Sculpture Court

TTABSS 2014 KICK OFF BY DR. BOYD BUTLER

6:00 – 6:10 PM

Helen DeVitt Jones Sculpture Court

POSTER SESSION

6:00 – 7:30 PM

Helen DeVitt Jones Sculpture Court

UNDERGRADUATE

1. PURIFICATION AND PARTIAL CHARACTERIZATION OF 4T1 CELL CYTOTOXINS FROM GINGER (*ZINGEBER OFFICINALE*)
Trevor A. Burrow*, Jessica R. Kenneson, Adam J. Reinhart, and Gary O. Gray
2. NATURAL KILLER CELL CYTOTOXICITY DRAMATICALLY REDUCED WITH HDIA1 KNOCKDOWN
Sarah Cotton*, Erin Kitten, and Boyd Butler
3. RESTRICTION MAPS OF A SEGMENT OF THE CHLOROPLAST GENOME OF FAST PLANTS (*BRASSICA RAPA*)
Clarissa Estrella*, and Paul Mangum

POSTER SESSION 6:00 – 7:30 PM

Helen DeVitt Jones Sculpture Court

4. OCCUPANCY ESTIMATES OF FERRUGINOUS HAWKS IN THE SNAKE RIVER BIRDS OF PREY AREA
Christopher K. Gulick*, Ben R. Skipper, and Clint W. Boal
5. BARCODES OF THE STANDARD AND MUTANTS OF FAST PLANT (*BRASSICA RAPA*)
Benjamyn Ortiz* and Paul Mangum
6. MOLECULAR EVOLUTION OF THE CYTOCHROME-B GENE IN MOLES (LIPOTHYPHLA: TALPIDAE) WITH DIFFERENT LEVELS OF FOSSORIALITY
Brian Rodriguez* and Jorge Salazar-Bravo
7. PTC DNA MARKER: AN ACCELERATED PROTOCOL
April Smith* and Paul Mangum

GRADUATE

8. EICOSAPENTAENOIC ACID REGULATION OF MUSCLE LIPID METABOLISM IN VIVO AND IN VITRO
Arwa Aljawadi*, Monique LeMieux, Nishan S Kalupahana, Kate Claycombe and Naima Moustaid-Moussa
9. WHITE-TAILED DEER RESEARCH AND CERVIDS RESEARCH PROGRAM: DRUG RESIDUE ANALYSIS
Shanoy C. Anderson*, Ernest E. Smith, Angella A. Gentles, Todd A. Anderson, Galen P. Austin and Steven M. Presley
10. CROWDING EFFECTS IN *Aedes aegypti* AND ITS POTENTIAL IMPACT ON INSECTICIDE SENSITIVITY
Thomas R. Bilbo*, Dan E. Dawson and Christopher J. Salice
11. ALBUMIN AFFECTS THE INTERSPECIES INTERACTIONS OF *PSEUDOMONAS AERUGINOSA* AND *STAPHYLOCOCCUS AUREUS*
Allie Clinton* and Kendra Rumbaugh

12. A FLUORESCENT MOLECULAR PROBE FOR TELOMERASE DETECTION IN CANCER CELLS
Patrick Dennis* and Lauren Gollahon
13. POPULATION DYNAMICS AND HABITAT USE OF ELK (*CERVUS ELAPHUS*) AT BOSQUE DEL APACHE NATIONAL WILDLIFE REFUGE
Ryan M. DeVore*, Mark C. Wallace, Matthew J. Butler, Stewart L. Liley, Ashley A. Inslee, and Philip S. Gipson
14. PRELIMINARY ANALYSIS OF HABITAT ASSOCIATIONS OF THE ENDEMIC DARKLING BEETLE *EPITRAGOSOMA ARENARIA* (COLEOPTERA: TENEBRIONIDAE)
Samuel A. Discua*, Justin Scott, and Scott D. Longing
15. TESTING A MODEL FOR THE PREDICTION OF ISOLATED WATER SITES IN THE SONORAN DESERT
Joseph C. Drake*, Jeffrey S. Jenness, Jordan Goetting, and Kerry L. Griffis-Kyle
16. ASSESSMENT OF LESSER PRAIRIE-CHICKEN USE OF WILDLIFE WATER GUZZLERS
Trevor Gicklhorn*, Clint W Boal, and Philip K Borsdorf
17. PREDATOR AND PREY USE OF WATER SITES IN THE SONORAN DESERT
Jordan M. Goetting*, and Kerry L. Griffis-Kyle
18. DOES MICROCLIMATE EXPLAIN SPATIAL VARIATION IN LESSER PRAIRIE-CHICKEN (*TYMPANUCHUS PALLIDICINCTUS*) NEST SURVIVAL?
Cody P. Griffin*, Clint W. Boal, Dave A. Haukos, and Blake A. Grisham
19. MOVEMENT RATES OF SWAINSON'S HAWKS FROM THE PLAINS OF TEXAS TO THE PAMPAS REGION OF ARGENTINA
Laurie M. Groen*, Clint W. Boal, James D. Ray, and Jimmy Walker
20. BIRD DIVERSITY, VEGETATION, AND HOUSE PRICES IN LUBBOCK, TX
Katherine P. Leuenberger*, Samantha S. Kahl, Michael C. Farmer, and Robert D. Cox
21. PESTICIDES AND PREDATOR CUES: MULTIPLE STRESSOR INTERACTION PATTERNS THROUGH TIME
Jarrett K. Louder*, Guangqiu Qin, and Jonathan D. Maul

22. PIWI VS. DNA TRANSPOSONS: IDENTIFYING PIWI HOMOLOGS IN VESPERTILIONID BATS.
Sarah F. Mangum*, Federico G. Hoffmann, and David A. Ray
23. TOOLS AND METHODS FOR ANALYZING FORMALDEHYDE IN THE MAMMAL FLUID COLLECTIONS AT THE NATURAL SCIENCE RESEARCH LABORATORY, MUSEUM OF TEXAS TECH
Timothy E. McSweeney*
24. THE ROAD TO SUCCESS: PERCEPTIONS OF CAREERS IN NATURAL RESOURCES AND FACTORS INFLUENCING RETENTION
Maria F. Mejia*, Tom Arsuffi, and Kerry Griffis-Kyle
25. EICOSAPENTAENOIC ACID REGULATES BROWN ADIPOSE TISSUE GENE EXPRESSION AND METABOLISM IN HIGH FAT FED MICE
Mandana Pahlavani*, Nishan S. Kalupahana, Monique LeMieux, Arwa Aljawadi, Shane Scoggin, Kate Claycombe, and Naima Moustaid-Moussa
26. GUADALUPE BASS (*MICROPTERUS TRECULII*) POPULATIONS RESPONSE TO POTENTIAL HYDROLOGIC IMPACTS OF URBANIZATION WITHIN THE COLORADO RIVER BASIN
Jessica Pease*, Timothy B. Grabowski, Allison Pease, and Preston T. Bean
27. EFFECTS OF CADMIUM AND DIET ON FEEDING, GROWTH, BEHAVIOR AND MACRONUTRIENT CONTENT IN *LYMNAEA STAGNALIS*
Evelyn G. Reátegui-Zirena¹*, Bridgette N. Fidler¹, and Christopher Salice¹
28. METABOLOMICS AND OPTICAL IMAGING SHOWS TISSUE SPECIFIC MITOCHONDRIAL OXIDATIVE STRESS AS EARLY BIOMARKERS OF POLYCYSTIC OVARY SYNDROME
Micheal Rogowski*, Ebru Selen, Sepideh Maleki, Zeinab Bolednazar, Zahra Ghanian, Marco Tonelli, Dan Butz, Mahsa Ranji, and Fariba Assadi-Porter
29. HYDROGEN PEROXIDE SIGNALING REDIRECTS CARBON FLOW FROM CELLULOSE SYNTHESIS TO TREHALOSE AND STARCH SYNTHESIS IN THE IMMATURE MUTANT OF *Gossypium hirsutum*
Nicholas E. Sanford*, and Thea A. Wilkins

30. OVER EXPRESSION OF MULTIPLE STRESS GENES TO INCREASE DROUGHT-, HEAT-, AND SALT-TOLERANCE IN COTTON
Jennifer Smith*, Neelam Mishra, Nardana Esmaceli, Li Sun, D. Auld, J. Burke, Paxton Payton and Hong Zhang
31. TISSUE SPECIFIC INDUCTION OF ChREBP ISOFORMS IN CARBOHYDRATE REFED MICE
Alexis Stamatikos*, Michael Rogowski, and Chad M. Paton
32. EXPRESSION AND CHARACTERIZATION OF A KINASE FROM CHILO IRIDESCENT VIRUS
Polrit Viravathana*, Saranya Ganapathy, Susan San Francisco, Michael San Francisco, Shan Bilimoria
33. DIFFERENTIAL REGULATION OF ADIPOKINE LEVELS AFTER BARIATRIC SURGERY
Nadeeja N. Wijayatunga*, Valerie G. Sams, Camille D. Blackledge, Nalin Siriwardhana, Matthew L. Mancini, Gregory J. Mancini, Monique LeMieux, and Naima Moustaid-Moussa
34. HUMAN DIMENSIONS OF URBAN WATER BODY USAGE IN LUBBOCK, TEXAS
Kristina J. Young*, Samantha. S. Kahl, Michael C. Farmer, and Kerry L. Griffis-Kyle
83. ECOLOGY AND NATURAL HISTORY OF THE SIBERIAN CHIPMONK, *TAMIAS SIBIRIICUS*, IN KOREA.
Yeong-seok Jo* and John T Baccus
84. THE ROLE OF EVOLUTION FOR THE INVASION OF SALT CEDAR (*TAMARIX RAMOSISSIMA*) ACROSS TEXAS
Soo-Rang Lee* and Matthew S. Olson

DETAIL SCHEDULE OF EVENTS

Saturday, March 29th

REGISTRATION

8:00-11:30 AM

Helen DeVitt Jones Sculpture Court

BREAKFAST

8:00-9:00 AM

Helen DeVitt Jones Sculpture Court

WELCOME

8:40-8:50 AM

Dr. Lou Densmore

Helen DeVitt Jones Auditorium

PLENARY TALK

9:00-10:00 AM

Dr. Paxton Payton

“Approaches to improved crop production in water limited environments”

Helen DeVitt Jones Auditorium

BREAK

10:00-10:15 AM

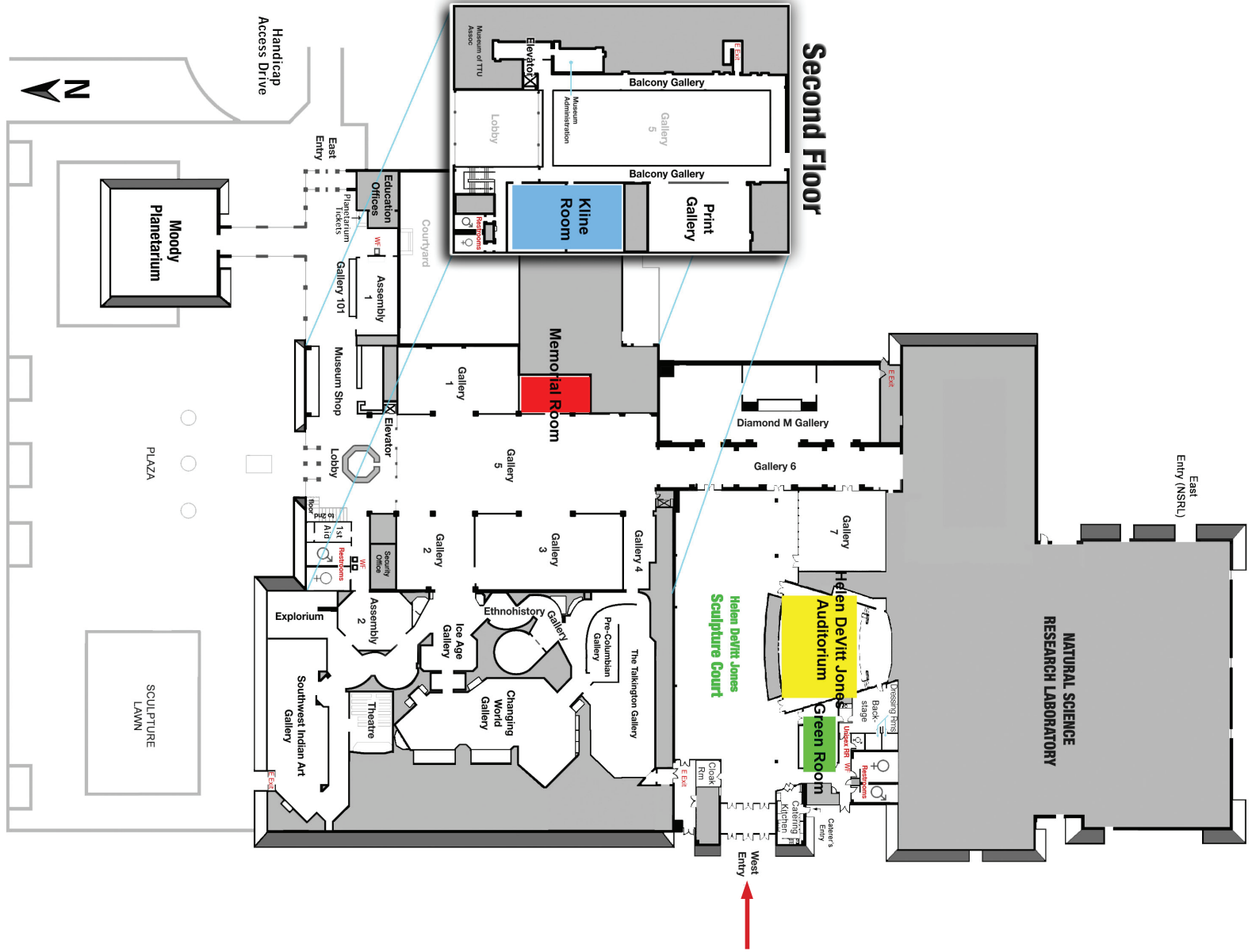
Helen DeVitt Jones Sculpture Court

ORAL PRESENTATIONS

10:15-11:15 AM

Green Room, Kline Room, Memorial Room, Helen DeVitt Jones Auditorium

Museum of Texas Tech University Interior Map



P A R K I N G

ORAL PRESENTATIONS

	PROPOSAL (Auditorium)	NATURAL RESOURCES MANAGEMENT (Green Room)	PLANT & SOIL SCIENCES (Kline room)	MICROBIOLOGY (Memorial Room)
10:15 AM	<p>71. REPRODUCTIVE BEHAVIOR AND MATING SYSTEM OF SPOTTED SEATROUT <i>CYNOSCION NEBULOSUS</i> Qingman Chen* and Timothy B. Grabowski</p>	<p>59. PRONGHORN POPULATION DYNAMICS AND HABITAT CONNECTIVITY IN THE TEXAS PANHANDLE Nathan P. Duncan*, Samantha S. Kahl, Shawn S. Gray, Christopher J. Salice and Richard D. Stevens</p>	<p>65. CELLULOSE: ABUNDANT BIOPOLYMER AND PRECURSOR FOR THE PREPARATION OF ADVANCED BIOMATERIALS Tanya E. Jackson*, Shanshan Li and Nouredine Abidi</p>	<p>55. ETP-LIKE TOXIN GENE EXPRESSION AND TOXIN DETECTION IN <i>BATRACHOCHYTRIUM DENDROBATIDIS</i> Amanda M. Hicks*, Susan San Francisco and Michael J. San Francisco</p>
10:30 AM	<p>72. SOIL MICROBIAL COMMUNITY RESISTANCE AND RESILIENCE TO PETRODIESEL VERSE -S BIODIESEL Meijun Dong* and Deborah Carr</p>	<p>60. SPATIAL VARIATION IN AQUATIC FOOD-WEB STRUCTURE IN AN ANTHROPOGENICALLY IMPACTED ARID-LAND RIVER Jessica L. East* and Allison A. Pease</p>	<p>66. EXTRACTION AND CHARACTERIZATION OF GALACTOMANNAN FROM GUAR SEEDS Sumedha P. Liyanage*, Nouredine Abidi and Dick L. Auld</p>	<p>56. WHOLE GENOME SEQUENCING OF TWO WOUND ISOLATED <i>PSEUDOMONAS AERUGINOSA</i> STRAINS TO IDENTIFY GENETIC MECHANISMS OF ANTIBIOTIC RESISTANCE Jessica L. Oates*, Eric Rees, Yan Sun and Stephen B. Cox</p>
10:45 AM	<p>73. USE OF A NOVEL NEST SUBSTRATE IN RESPONSE TO PREDATION RISK IN A NEOTROPICAL MIGRATORY BIRD, THE VEERY (<i>CATHARUS FUSCESCENS</i>) Elizabeth A. Farley-Dawson* and Kenneth A. Schmidt</p>	<p>61. SOME LIKE IT HOT: THE ROLE OF FIRE IN TEXAS HORNED LIZARD HABITAT MANAGEMENT Rachel M. Granberg*, Robin M. Verble and Gad Perry</p>	<p>67. THE EFFECT OF CONSTITUTIVELY OVEREXPRESSING THE GENE FOR TOMATO FRUCTOKINASE (<i>LeFRK1</i>) ON COTTON YIELD IN GREENHOUSE AND FIELD TRIALS. Thiya Mukherjee*, Mariana Ivanova, Marisela Dagda, Paxton Payton, Dennis Gitz, David Granod and A. Scott Holaday</p>	<p>57. BIOFILM FORMATION BY THE FUNGAL PATHOGEN <i>BATRACHOCHYTRIUM DENDROBATIDIS</i> ENHANCES TEMPERATURE TOLERANCE Shalika Silva*, Lisa Atkins, Nancy L. Carty, Angela Moss, Uzma Qaisar, Abdul N. Hamood and Michael J.D. San Francisco</p>
11:00 AM	<p>74. URBANIZATION OF PLAYA WETLANDS IN THE SOUTHERN HIGH PLAINS: PRESENT AND FUTURE PATTERNS UNDER FOUR GROWTH SCENARIOS Lucas J. Heintzman* and Nancy E. McIntyre</p>	<p>62. SEASON-SPECIFIC LAND-USE BY BIRDS OF PREY IN THE SOUTHERN HIGH PLAINS: IMPLICATIONS FOR WIND ENERGY DEVELOPMENT Kristen M. Linner* and Clint W. Boal</p>	<p>68. GROUND COVER FRACTION FROM GREEN AND RED CHANNELS OF A DIGITAL CAMERA Bablu Sharma* and Glen L. Ritchie</p>	<p>58. EFFECTS OF DAILY SOIL TEMPERATURE RANGE ON MICROBIAL COMMUNITY DYNAMICS IN A COTTON PRODUCTION SYSTEM: IMPLICATIONS FOR SUSTAINABILITY Diana L Vargas-Gutierrez*, John C</p>

11:15
AM

BREAK

Helen DeVitt Jones Sculpture Court

11:30
AM

11:45
AM

12 PM

PROPOSAL (Auditorium)	NATURAL RESOURCES MANAGEMENT (Green Room)	PLANT & SOIL SCIENCES (Kline room)
<p>75. OPTIMIZING PHOSPHATE UPTAKE OF FRESHWATER CYANOBACTERIA AND MICROALGAE: EVALUATING ABIOTIC CONTROLS Neha Kumari*, and John C. Zak</p>	<p>63. ASSESSING HABITAT-USE PATTERNS AND SURVEY METHODOLOGIES OF THE ENDANGERED SNAIL, <i>ASSIMINEA PECOS</i> AT BITTER LAKE NATIONAL WILDLIFE REFUGE Elizabeth L. Roesler*, Timothy B. Grabowski and David Rogowski</p>	<p>69. SEASONAL CHANGES IN NITROGEN-USE STRATGIES AND SOIL NITROGEN AVAILABITLY IN NATIVE AND INVASIVE WETLAND PLANTS Elizabeth F. Waring*, Jennifer Moore-Kucera and A. Scott Holaday</p>
<p>76. RETURN OF THE PHANTOM ROAD: THE EFFECTS OF ROAD NOISE ON PASSERINE BREEDING ECOLOGY AND ON THE PERCEIVED PREDATION RISK OF A NEST PREDATOR, THE EASTERN CHIPMUNK (<i>TAMIAS STRIATUS</i>) Douglas J. Perez*, Kenneth A. Schmidt, and Jesse R. Barber</p>	<p>64. REPEATED STRIP SPAWNING OF SMALLEYE SHINER (<i>NOTROPIS BUCCULA</i>) AND SHARPNOSE SHINER (<i>NOTROPIS OXYRHYNCHUS</i>) FROM CAPTIVE BROOD STOCKS. Aaron C. Urbanczyk*, Gene R. Wilde and Kevin B. Mayes</p>	<p>70. DIGITAL IMAGE ANALYSIS OF OLD WORLD BLUESTEM CANOPY COVER AND LEAF AREA Yedan "Victoria" Xiong*, C.P. West and C.P. Brown</p>
LUNCH BREAK		

	EVOLUTIONARY BIOLOGY (Auditorium)	TOXICOLOGY (Green Room)	UNDERGRADUATE (Kline room)	CELL & MOLECULAR BIOLOGY (Memorial Room)
01:30 PM	46. SENSORY ECOLOGY OF MATING BEHAVIORS IN THE INFRAORDER CULICOMORPHA (DIPTERA). Priyanka de Silva *, Art Borkent and Ximena E. Bernal	77. DEVELOPMENT OF A PASSIVE SAMPLER TO MEASURE UPTAKE OF PERFLUORINATED COMPOUNDS Rebecca S. Cochran *, Heather Lanza, Joe Mudge, Brett Blackwell, and Todd A. Anderson	35. THE EFFECTS OF SOIL NITROGEN AVAILABILITY ON THE ALLOCATION OF NITROGEN TO LEAF PROCESSES FOR AN INVASIVE GRASS, <i>PHALARIS ARUNDINACEA</i>, AND NATIVE <i>CAREX</i> SPECIES Chelsea M. Griffin *, Elizabeth f. Waring and A. Scott Holaday	37. EVALUATION OF A MODIFIED VIRAL INSECTICIDAL GENE USING AN <i>AGROBACTERIUM</i>-MEDIATED TRANSIENT EXPRESSION SYSTEM IN TOBACCO Saranya Ganapathy *, Megha N. Parajulee , Hong Zhang and Shan L. Bilimoria
01:45 PM	47. PHYLOGEOGRAPHY AND THE ORIGIN OF FREE-RANGING ELK (<i>CERVUS CANADENSIS</i>) IN TEXAS Christopher D. Dunn *, Matthew R. Mauldin and Robert D. Bradley	78. POPULATION EFFECTS OF SIB-LETHAL MALATHION EXPOSURE TO LARVAE OF THE YELLOW-FEVER MOSQUITO, <i>Aedes Aegypti</i>; INFLUENCE OF CHEMICAL CONCENTRATION, TEMPERATURE AND AGE AT EXPOSURE. Daniel E. Dawson *, Scott M. Weir, Adric D. Olson, Thomas R. Bilbo and Christopher J. Salice	36. DEVELOPMENT OF DOCUMENTATION SYSTEM USING A HIGH-END DSLR CAMERA Jessica Rose Kenneson * and Robert Lee Moore	38. EICOSAPENTAENOIC ACID REDUCES HIGH-FAT DIET-INDUCED INSULIN RESISTANCE BY ALTERING ADIPOSE TISSUE GLYCOLYTIC AND INFLAMMATORY FUNCTION Monique LeMieux *, Nishan S Kalupahana, Arwa Aljawadi, Mandana Pahlavani, Shane Scoggin, Kate J Claycombe and Naima Moustaid-Moussa
02:00 PM	48. ON THE IDENTITY OF <i>PEROMYSCUS</i> ON GRAND MANAN ISLAND, NEW BRUNSWICK, CANADA Howard M. Huynh *, Jessie Norman, Donald F. McAlpine, Karen J. Vanderwolf, Robert J. Baker and Robert D. Bradley	79. DETECTION OF PERFLUORINATED COMPOUNDS IN BIOTA NEAR BARKSDALE AIR FORCE BASE, LOUISIANA Heather A. Lanza * and Todd A. Anderson		39. FOOD DEPRIVATION AND STRESSOR EXPOSURE ALTER TECTAL CRF CONCENTRATIONS IN AFRICAN CLAWED FROGS (<i>XENOPUS LAEVIS</i>) Christine Prater *, Carlos Garcia, Breanna Harris and James A. Carr

	EVOLUTIONARY BIOLOGY (Auditorium)	TOXICOLOGY (Green Room)	
02:15 PM	49. SPECIES DIVERSITY IN THE GENUS <i>CALOMYS</i> (RODENTIA: SIGMODONTINAE) Narayan Kandel* and Jorge Salazar-Bravo	80. DEVELOPING A MULTI-COMPARTMENT PERFLUOROOCANE SULFONATE (PFOS) UPTAKE AND DEPURATION MODEL FOR FISH Adric D. Olson*, Meghan A. Funkhouser, Todd A. Anderson, and Christopher J. Salice	
02:30 PM	BREAK <i>Helen DeVitt Jones Sculpture Court</i>		
02:45 PM	50. A PHYLOGENETIC ASSESSMENT OF THE SUBFAMILY NEOTOMINAE (RODENTIA: CRICETIDAE) USING COMBINED MOLECULAR DATA Megan S. Keith*, Roy N. Platt II, Brian R. Amman and Robert D. Bradley	81. CARBON NANOTUBE UPTAKE, TRANSLOCATION, AND STRESS EFFECTS IN DROUGHT INDUCED CORN (<i>ZEA MAYS</i> L.) GROWN IN SOIL Amanda M. Parra*, Kristina L. Kohl, Sabrina Deleon, Babina Shrestha, Fahmida Irin, Mohammad Saed, Micah J. Green, Paxton Payton and Jaclyn E. Cañas-Carrell	ECOLOGY (Kline Room)
03:00 PM	51. MOLECULAR GENETICS OF COLD TOLERANCE VARIATION AMONG NATURAL POPULATIONS OF <i>POPULUS BALSAMIFERA</i> ACROSS THE GROWING SEASON Mitra Menon* and Matt Olson	82. AN ASSESSMENT OF POTENTIAL STRESSORS TO DUNES SAGEBRUSH LIZARD (<i>SCELOPORUS ARENICOLUS</i>) HABITAT IN WESTERN TEXAS AND AN ANALYSIS OF THE ENDANGERED SPECIES ACT (ESA) CLASSIFICATION PROCESS Brie D. Sherwin*, Todd A. Anderson, Christopher J. Salice,	40. DO RIVER-RESERVOIR INTERFACES SERVE AS SURROGATE NURSERIES FOR FLOODPLAIN-DEPENDENT RIVERINE FISHES? Matthew R. Acre*, Nathan G. Smith and Timothy B. Grabowski
03:15 PM	52. MOLECULAR PHYLOGENETICS OF THE <i>NEOTOMA MEXICANA</i> SPECIES GROUP (VERTEBRATA: MAMMALIA: RODENTIA: CRICETIDAE) IN MESOAMERICA: EVIDENCE FOR RECOGNITION OF <i>N. FERRUGINEA</i> TOMES 1861 Nicté Ordóñez-Garza*, Cody W. Thompson, Margaret K. Unkefer, Cody W. Edwards, James G. Owen and Robert D. Bradley		41. DIFFERENCES IN NEOPHOBIA BETWEEN CANE TOADS FROM INTRODUCED AND NATIVE POPULATIONS Sarah A. Candler* and Ximena E. Bernal
			42. DETECTION OF PREDATORY FISH KAIROMONES BY OVIPOSITING MOSQUITOES Lauren L. Eveland*, Alon Silberbush, and William J. Resetarits

	EVOLUTIONARY BIOLOGY (Auditorium)	ECOLOGY (Kline Room)
03:30 PM	53. PHYLOGENETIC RECONSTRUCTIOS OF DERMANURA: INCONGRUENCE OF MULTIPLE MARKERS Julie A. Parlos*, Caleb D. Phillips and Robert J. Baker	43. ROOST ENSEMBLES OF INSECTIVOROUS BATS DIFFER IN RESPONSE TO COFFEE AGRICULTURE IN SOUTHEAST ASIA Joe C.-C. Huang*, Elly Jazdyk, Meyner Nusalawo and Tigga Kingston
03:45 PM	54. IS ZONADHESIN A USEFUL MOLECULAR MARKER FOR DETERMINING PHYLOGENETIC RELATIONSHIPS AMONG MAMMALIAN ORDERS? Emma K. Roberts*, Daniel M. Hardy and Robert D. Bradley	44. YOU "ROT" MY WORLD!: HOW DECOMPOSITION INFLUENCES LITTER FLAMMABILITY Rita Margarida Magalhães* & Dylan W. Schwilk
04:00 PM	Special Topic: THE SWANSON PYRAMID OF GREATNESS PARADIGM: INFLUENCE ON MALE EVOLUTIONARY BEHAVIOR Elizabeth Waring* and Boyd Butler	45. RELUCTANCE TO SING: CHANGES TO VEERY DUSK CHORUS ASSOCIATED WITH INDIRECT PREDATOR CUES Andrea L. Reinhardt*, and Kenneth A. Schmidt

COLLECTIONS & EXHIBIT VIEWING

6:30-9:00 PM

Helen DeVitt Jones Sculpture Court

AWARDS BANQUET

7:00-9:00 PM

Helen DeVitt Jones Sculpture Court

ABSTRACTS

POSTER (UNDERGRADUATE)

1. PURIFICATION AND PARTIAL CHARACTERIZATION OF 4T1 CELL CYTOTOXINS FROM GINGER (*ZINGEBER OFFICINALE*)

Trevor A. Burrow^{1*}, Jessica R. Kenneson¹, Adam J. Reinhart² and Gary O. Gray¹

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Previous work has shown alcoholic extracts of powdered ginger root to be cytotoxic to murine 4T1 breast cancer cells grown in culture, likely via apoptosis (programmed cell death). In this study, purification and identification of the cytotoxic compounds in ginger root were undertaken. Powdered ginger root was subjected to acetone reflux, and the resulting extract resolved into its component compounds by two rounds of thin layer chromatography (TLC). Three biologically active compounds (Bands 5, 6 and 9) were isolated and analyzed by high performance liquid chromatography (HPLC) and TLC in attempts to identify these compounds. The biological activity of the compounds was evaluated by bioluminescent cell viability assays. Additionally, 4T1 cells were treated in culture (24 hours) with the isolated compounds, and the effects on cellular protein expression were evaluated via one-dimensional polyacrylamide gel electrophoresis and Western blot analysis utilizing monoclonal antibodies specific for caspases (which mediate apoptosis). Western blot analysis supported a caspase-dependent mechanism of cell death. The involvement of an apoptotic pathway was confirmed by two-dimensional electrophoretic analysis of the cellular proteins after treatment with the purified compounds. HPLC and TLC analysis of the purified compounds showed that Band 5 co-migrated with 6-gingerol, and Band 9 co-migrated with 6-shogaol. Band 6 was chromatographically distinct and did not co-migrate with tested standards that are reported in the literature. Data suggest that Band 5 is 6-gingerol, Band 9 is 6-shogaol and Band 6 is likely a derivative of 6-shogaol. Characterization of Bands 5, 6 and 9 is ongoing.

2. NATURAL KILLER CELL CYTOTOXICITY DRAMATICALLY REDUCED WITH HDIA1 KNOCKDOWN

Sarah Cotton^{1*}, Erin Kitten² and Boyd Butler²

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²Department of Biological Sciences, TTU, Lubbock, Texas 79409

Natural killer (NK) cells are an integral component of the innate immune system and their function is to locate stressed, virally infected or tumorigenic cells and destroy them effectively by secreting lytic granules. The lytic synapse (LS) is the junction or interface between the NK cell and the potential target cell and formation of the LS requires precise coordination of signaling and adhesion receptors, as well as a rearrangement of the cytoskeleton. Cytoskeletal reorganization promotes lytic granule polarization towards the target cell thus leading to target cells lysis. Two components of the cytoskeleton include actin and microtubules, with actin rearrangement responsible for LS formation and microtubules are responsible for the transport of the lytic granules to the lytic synapse. In this study, hDial, a member of the forming family of actin nucleators, expression was knocked down to determine what role it plays in the structure and function of the lytic synapse. In this study, we observed that hDial is not required for adhesion to the target cell or lytic synapse formation; however, NK-mediated cytotoxicity was still greatly decreased. This indicates that hDial is integral in the transport of the lytic granules to the lytic synapse rather than establishing the structure of the synapse.

3. RESTRICTION MAPS OF A SEGMENT OF THE CHLOROPLAST GENOME OF FAST PLANTS (*BRASSICA RAPA*)

Clarissa Estrella^{1*} and Paul Mangum¹

¹Department of Biology, Midland College, Midland, Texas 79705

The Fast Plant, *Brassica rapa*, cv. rapid cycling, is used as a teaching tool for genetic concepts in high school and college biology classes. The Fast Plant is useful because it completes a life cycle in 40 days, is easy to grow, and there are several phenotypic mutant varieties available. The aim of this project was to develop a method of mapping a segment of the chloroplasts genome in Fast Plants that could be used as a biotechnology lab in a general biology classroom. DNA isolated from the standard Fast Plant and the mutants non-purple, petite, tall, variegated, and yellow-green were analyzed as follows. The universal chloroplast PCR primer set, forward *trnK* and reverse *trnK* (from Grivet, *et al.*) was used to amplify a segment of the chloroplast genome. Separate digestions of the PCR product were completed using the following restriction enzymes: AluI, BssSI, BstBI, CviQI, DdeI, EarI, and HpaII. Restriction enzyme maps for each enzyme will be presented.

4. OCCUPANCY ESTIMATES OF FERRUGINOUS HAWKS IN THE SNAKE RIVER BIRDS OF PREY AREA

Christopher K. Gulick^{1*}, Ben R. Skipper¹ and Clint W. Boal^{1,2}

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²U.S. Geological Survey, Texas Cooperative Fish and Wildlife Research Unit, TTU, Lubbock, TX 79409

Ferruginous hawks (*Buteo regalis*) are large, prairie dwelling raptors of western North America. The species is declining in some parts of their range, which has been attributed to reduced grassland, making the species of increasing concern. To investigate their occupancy at the Snake River Birds of Prey National Conservation Area, we used fixed radius circular plots to survey for ferruginous hawks at 50 randomly located study plots. Each plot was surveyed for one hour, three times during May of 2012 and 2013. We used occupancy modeling to evaluate the effects of year, utility pole presence, and distance to cliffs on occupancy estimates. Temperature, time, utility pole presence, and year were used to estimate probability of detection. Using these covariates, we evaluated a set of ten *a priori* models. Our top model included the effect of utility pole presence on probability of detection. When utility poles were present on survey plots, our probability of detecting ferruginous hawks was greater than twice that when utility poles were absent ($p = 0.49$ and 0.19 , respectively). Utility poles also appear to be important for occupancy of ferruginous hawks, with estimates of occupancy of 0.95 and 0.37, for plots with and without utility poles, respectively. Models including effects of year, time, temperature, and proximity to cliffs received little support. Our data suggests that presence of utility poles affects both the occupancy and detection of these birds. Managers could use the addition or removal of poles to influence the occurrence of ferruginous hawks in a landscape.

5. BARCODES OF THE STANDARD AND MUTANTS OF FAST PLANT (*BRASSICA RAPA*)

Benjamyn Ortiz^{1*} and Paul Mangum²

¹Department of Biological Sciences, Sul Ross State University, Alpine, Texas 79832

²Department of Biology, Midland College, Midland, Texas 79705

DNA barcodes are being developed as a new method of species identification. Barcode identification relies on using a standard segment or segments of the genome that, in a natural setting, has a mutation rate that is rapid enough to provide discrimination between species but not so frequent as to vary within a species. Model organisms are exposed to laboratory conditions in which mutations are selected; therefore the mutation rate is expected to be higher than in natural environments. The Fast Plant, *Brassica rapa* cv. rapid cycling, is a model genetic organism for which a number of mutant varieties have been selected. This project was conducted to determine if the barcode region *RbcL* has remained constant during the mutant selection process. The null hypothesis for this study was that the barcode region would remain constant for all mutant varieties because each represents the same species. Upon investigation the hypothesis has been shown to be fairly robust with the exception of two possible variations.

6. MOLECULAR EVOLUTION OF THE CYTOCHROME-B GENE IN MOLES (LIPOTHYPHLA: TALPIDAE) WITH DIFFERENT LEVELS OF FOSSORIALITY

Brian Rodriguez^{1*} and Jorge Salazar-Bravo¹

¹Department of Biological Sciences, TTU, 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 mitochondrially-encoded gene participating in oxidative phosphorylation in talpids with different life-styles in this monophyletic family. Several methods useful to detect the presence and direction of selection at the molecular level require 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 multilocus 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 used two alternative approaches to test for this hypothesis: a) we estimated the rates of synonymous (dS) and nonsynonymous (dN) substitutions and ω along different branches, across codons and simultaneously across codons and along lineages in the family, and b) we tested for positive selection on quantitative physicochemical amino acid properties. Here, we present the results of the tests and discuss our findings with respect to the main hypothesis.

7. PTC DNA MARKER: AN ACCELERATED PROTOCOL

April Smith^{1*} and Paul Mangum²

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²Department of Biology, Midland College, Midland, Texas 79705

This research project was initiated to shorten the time required to produce a DNA fingerprint that can be used to accurately predict an individual's PTC taste phenotype. The accelerated protocol could then be used in teaching laboratories and for community outreach presentations. Experiments were conducted to determine the time limits required to extract cellular DNA and shorten the standard protocol. The time required to complete the following steps of the protocol were decreased: DNA isolation from human cheek cells, PCR amplification of a 220 bp amplicon, restriction enzyme digestion of the 220 bp PCR amplicon and electrophoresis of the resulting fragments. The goal of the project was to shorten the time required to complete the standard protocol from a minimum of 4 – 6 hours to around 1 hour using a PIKO thermocycler and E-gel electrophoresis equipment.

POSTER (GRADUATE)

8. EICOSAPENTAENOIC ACID REGULATION OF MUSCLE LIPID METABOLISM *IN VIVO* AND *IN VITRO*

Arwa Aljawadi^{1*}, Monique LeMieux¹, Nishan S. Kalupahana², Kate Claycombe³ and Naima Moustaid-Moussa¹.

¹Nutritional Sciences, TTU, Lubbock, TX,

²Physiology, University of Peradeniya, Peradeniya, Sri Lanka

³USDA-ARS GFHNRC, Grand Forks, ND

Eicosapentaenoic acid (EPA), an omega 3 fatty acid, exerts potent anti-inflammatory and hypolipidemic effects. We previously reported that mice fed high fat diets supplemented with EPA (HF-EPA) were resistant to diet-induced obesity, inflammation and insulin resistance. Here we further investigate both *in vivo* and *in vitro* the mechanisms by which muscle tissue contributes to the metabolic benefits of EPA. We compared changes in gene and protein expression and tissue metabolites in mice fed either HF or HF-EPA for 11 weeks and in C2C12 cells treated with or without EPA. Docosahexaenoic acid, saturated fatty acids (SFA) and cholesterol precursors were increased in muscle of mice fed HF-EPA vs. HF. Surprisingly, EPA increased fatty acid oxidation in adipose tissue but not in muscle. To determine mechanisms mediating direct effects of EPA in muscle *in vitro*, we used the mouse myocyte cell line C2C12 cells. Consistent with our findings *in vivo*, treatment of C2C12 cells with 50M EPA increased lipoprotein lipase (Lpl) gene expression in a time - dependent manner while fatty acid oxidation was unchanged. In conclusion, high fat diets supplemented with EPA increased SFA and cholesterol precursors content in muscle with no significant changes in fatty acid oxidation. These finding suggest a possible unique role of EPA in mediating muscle cholesterologenesis in mice. Funding support: USDA, AHA, and TTU (COHS and OVPR)

9. WHITE-TAILED DEER RESEARCH AND CERVIDS RESEARCH PROGRAM: DRUG RESIDUE ANALYSIS

Shanoy C. Anderson^{1*}, Ernest E. Smith¹, Angella A. Gentles¹, Todd A. Anderson¹, Galen P. Austin¹ and Steven M. Presley¹

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The development and validation of analytical methods to identify and quantitate drug residues in cervids will provide significant benefits to the White-tailed deer health program in general. To this end we are validating established High Performance Liquid Chromatography (HPLC) and Liquid Chromatography/Mass Spectrometry (LC/MS) methods as a first step in the White-tailed Deer Research Program at The Institute of Environmental and Human Health at TTU.

10. CROWDING EFFECTS IN AEADES AEGYPTI AND ITS POTENTIAL IMPACT ON INSECTICIDE SENSITIVITY

Thomas R. Bilbo^{1*}, Dan E. Dawson² and Christopher J. Salice³

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Aedes aegypti is a globally important mosquito because it is the principle vector for both dengue and yellow fever. In order to better control *A. aegypti* populations it is necessary to thoroughly understand its ecology, life history traits and response to control methods (primarily insecticides). One important aspect of mosquito ecology is larval density, which can have strong effects on larval survival and future fitness. Density interactions can result from resource competition or crowding effects, the latter of which has received less research attention but is ecologically important. Previous studies have shown both physical and chemical components to crowding interactions in larval mosquitoes, but that effects can differ between species and even among different strains of a single species. Larval crowding also results in increased mortality, reduced female fecundity and prolonged larval development. The objectives of this research are: 1) to first characterize the effects of crowding on survival and larval development and to determine at what density crowding effects become significant; and 2) to then determine to what extent larval crowding affects sensitivity to insecticide exposure. I hypothesize that crowding is a potent enough stressor to have a synergistic effect with insecticide exposure and that a specific density can be determined where the combined effect becomes biologically significant. These results will provide important information on how natural mosquito populations respond to control efforts as well providing empirical recommendations on designing laboratory toxicity tests so that they better reflect the true sensitivity and resistance levels of natural mosquito populations.

11. ALBUMIN AFFECTS THE INTERSPECIES INTERACTIONS OF *PSEUDOMONAS AERUGINOSA* AND *STAPHYLOCOCCUS AUREUS*

Allie Clinton^{1*} and Kendra Rumbaugh¹

¹Department of Surgery, TTU Health Sciences Center

Chronic wound infections have high morbidity and mortality in a large patient population annually. *Pseudomonas aeruginosa* (PA) and *Staphylococcus aureus* (SA) are the two most common bacteria in chronic wounds, but little is known about their interspecies relationship. The paucity of studies examining the pathogen interactions may result from the technical difficulty of growing them together. Though frequently found together in infections, PA kills SA when the two planktonic populations are grown in co-cultures *in vitro*. This 'killing' has been attributed to staphylolytic exoproducts that PA produces, many of which are controlled by quorum sensing (QS). PA QS involves three regulatory systems which alter the expression of over 5% of PA genes in response to the amount of chemical signals. We sought to examine the relationship between PA and SA in an *in vitro* 'wound-like' environment. When PA and SA were co-cultured in standard media (LB), PA killed SA within 8 hours; however when the two were cultured in a 'wound-like media' (WLM) we observed inhibition of SA. We tested PA mutants for their ability to kill SA; only those with mutations high in the QS hierarchy were unable to kill SA. We hypothesized that some WLM component inhibited PA QS, which we systematically isolated to serum albumin. When PA is grown in the presence of albumin, both SA-killing and other products of PA QS are inhibited. Our data demonstrate that the ability of PA SA-killing is controlled by QS, and that serum albumin is able to inhibit this killing.

12. A FLUORESCENT MOLECULAR PROBE FOR TELOMERASE DETECTION IN CANCER CELLS

Patrick Dennis^{1*} and Lauren Gollahon¹

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The ribonucleoprotein telomerase is a nearly indispensable survival factor for proliferating cancer and stem cells. This claim is supported by the observation that close to 90% of human tumor samples examined thus far with the Telomere Repeat Amplification Protocol (TRAP) demonstrate enzymatically-active telomerase. As a result, most immortalized cell lines derived from human tumors also share this phenotype, with the remainder maintaining telomere integrity through a poorly defined pathway that utilizes recombination-associated protein(s). Despite the near ubiquity of telomerase expression among tumors, and a possible relationship between the level of telomerase expression and/or activity, and the "aggressiveness" of tumors, there are no convenient assays for the clinical quantification of telomerase in oncology units. The experiments that are described subsequent to this introduction are based on a fluorescent DNA probe, or molecular beacon, that possesses a sequence construction which mimics the single-stranded 3' overhang of telomeric DNA (tel-MB). Consequently, binding interactions between telomerase and the tel-MB results in proportional fluorescence output. Four different cell lines that differ with regard to expression and enzymatic activity of hTERT were assayed for binding and show a reproducible

hierarchy of activity that is comparable and complementary to currently existing methodologies that were performed in parallel.

13. POPULATION DYNAMICS AND HABITAT USE OF ELK (CERVUS ELAPHUS) AT BOSQUE DEL APACHE NATIONAL WILDLIFE REFUGE

Ryan M. DeVore^{1*}, Mark C. Wallace¹, Matthew J. Butler², Stewart L. Liley³, Ashley A. Inslee⁴ and Philip S. Gipson¹

¹Department of Natural Resources Management, TTU, Lubbock, TX 79409

²Division of Biological Services, National Wildlife Refuge System, U.S. Fish and Wildlife Service, Albuquerque, NM 87103

³New Mexico Department of Game and Fish, One Wildlife Way, Santa Fe, NM 87507

⁴Bosque del Apache National Wildlife Refuge, U.S. Fish and Wildlife Service, San Antonio, NM 87832

Elk (*Cervus elaphus*) abundance has recently increased at Bosque del Apache National Wildlife Refuge, New Mexico. The Refuge's primary management objective is to provide habitat and food for waterfowl and sand-hill cranes (*Grus canadensis*) that overwinter at the Refuge or use it during their migration. To provide an adequate amount of supplemental nutrition for the birds, cornfields are planted on the Refuge. Elk are depredate the corn crops, thereby interrupting the Refuge's management strategy. The objectives of this study are to estimate the population dynamics and habitat use of the herd. To examine these factors, we marked adult elk with radio- or GPS collars to estimate adult survival, recruitment, and movements. We are constructing a population model to use as a tool to guide harvest management. We will use the habitat use information to determine what habitat manipulations may be incorporated to deter elk depredation. The intended outcome is to minimize the amount of crop damage by elk on the Refuge.

14. PRELIMINARY ANALYSIS OF HABITAT ASSOCIATIONS OF THE ENDEMIC DARKLING BEETLE *EPITRAGOSOMA ARENARIA* (COLEOPTERA: TENEBRIONIDAE)

Samuel A. Discua^{1*}, Justin Scott¹ and Scott D. Longing¹

¹Department of Plant and Soil Science, TTU, Lubbock, TX 79409

The Monahans and Mescalero sandhills of western Texas and eastern New Mexico are home to very unique insect biodiversity. Numerous endemic species are known to occur only in this region, such as the darkling beetle *Epitragosoma arenaria* (Coleoptera: Tenebrionidae). Very little is known about this species other than previously reported observations of its association with the native grass *Panicum havardii*. This preliminary study sought to determine habitat associations of *E. arenaria* across different types of vegetation from August through October, a time period including the peak flowering of *Panicum havardii*. We conducted linear belt-transect sampling (1m in width, n = 67) to acquire data on vegetational composition and flowering structure and to relate this information to densities of *E. arenaria*. Principal components analysis was used to explore the relationships of *E. arenaria* and vegetation structure and composition. Using data pooled across months, PCA showed a strong positive relationship of *E. arenaria* and densities of *Panicum* stems in flower (PC1 and PC2 explained 30.0 and 15.7 % of variation in data). With PCAs performed individually by month, *E. arenaria* was associated with percent open sand and densities of both *Panicum* stems and stems in flower in August and September, whereas in October *E. arenaria* showed stronger associations with open sand and blooming *Helianthus* density. These preliminary findings suggest temporal differences in *E. arenaria* abundances across months and vegetation types, and further suggest that *E. arenaria* might use a wider variety of plants as a food source and shelter than previously observed.

15. TESTING A MODEL FOR THE PREDICTION OF ISOLATED WATER SITES IN THE SONORAN DESERT

Joseph C. Drake^{1*}, Jeffrey S. Jenness², Jordan Goetting¹ and Kerry L. Griffis-Kyle¹

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Water is an extremely limiting resource in arid regions and wildlife managers need accurate inventories to better manage natural resources. Many of the water sources in the Sonoran Desert are tinajas, solid rock bottom pools of varying sizes. These and other isolated and ephemeral water resources are essential for desert wildlife. We developed an approach to predict the location of unidentified isolated waters in the Sonoran Desert of Arizona, USA. We used Mahalanobis distance bases on topographic wetness and slope to indicate groups of pixels in GIS that are the most similar in these aspects to locations of currently known waters. We tested this model in southwestern Arizona on the Barry M. Goldwater Range, U.S. Air Force, comparing polygons of predicted waters with random polygons and had a 74% success rate of finding a location of standing surface water within the predicted polygon versus a 28% success rate of finding standing water in random polygons. This modeling technique could provide a new tool for researchers and land managers for wildlife conservation goals.

16. ASSESSMENT OF LESSER PRAIRIE-CHICKEN USE OF WILDLIFE WATER GUZZLERS

Trevor Gicklhorn^{1*}, Clint W Boal² and Philip K Borsdorf¹

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Man-made water sources are a common wildlife management tool in arid regions, but their value for wildlife populations is not well understood. The value of water as a conservation tool for lesser prairie chickens (*Tympanuchus pallidicinctus*) is unknown. We assessed if lesser prairie chickens would use commercially available wildlife water guzzlers and if there was any apparent selection between two design types. We confirmed that lesser prairie chickens would use bird friendly designed wildlife water guzzlers. Although both designs were used, we found significantly greater use of a design that had a wider water trough and ramp built into the tank cover compared to a design that had a longer, narrower trough extending from the tank. Although we did not assess the physiological need of surface water by lesser prairie chickens, we were able to verify that they will use wildlife water guzzlers to access surface water. If it is found surface water is beneficial for lesser prairie chickens, game bird friendly designed guzzlers may be a useful conservation tool the species.

17. PREDATOR AND PREY USE OF WATER SITES IN THE SONORAN DESERT

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Land managers have established artificial water sites in arid systems to provide wildlife with a limiting resource. Differences in structure between artificial and natural water sites may influence how wildlife uses these sites. Concerns have also been raised that predators, such as bobcats (*Felis rufus*), mountain lions (*Felis concolor*), and coyotes (*Canis latrans*), use artificial catchments as ambush sites for hunting prey species such as white-tailed deer (*Odocoileus virginianus*) and mule deer (*Odocoileus hemionus*). This study examines patterns of daily and seasonal use of natural and artificial water sites by desert mammals. Camera traps were set up at 21 sites across five mountain ranges on the Barry M. Goldwater Range-East in southwest Arizona over 2011 and 2012, during the months of April through September. This time period captured both dry season and wet season wildlife use. We found no evidence of water sites being used as ambush sites by predators, with deer species visiting water sites earlier in the evening than predator species and no evidence for differences in patterns of use between natural and artificial waters. This research provides support for the idea that artificial wildlife waters provide more benefit than harm to target game species.

18. DOES MICROCLIMATE EXPLAIN SPATIAL VARIATION IN LESSER PRAIRIE-CHICKEN (*TYMPANUCHUS PALLIDICINCTUS*) NEST SURVIVAL?

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The lesser prairie-chicken metapopulations are found along a diverse climatic gradient throughout their range. Climactic variables such as ambient temperature and humidity are critical factors known to affect the presence of lesser prairie-chicken hens on their nest during incubation. We used iButton® data loggers to record temperature and humidity at ground level near each nest. Data was collected in 2010 (n=6), 2011 (n=3), and 2012(n=7) in the shinnery oak prairie of Texas. In 2013, data was collected in the shortgrass (n=10) and mixed-grass (n=17) habitat of Kansas. We used logistic regression to determine the effect of temperature and humidity on nest abandonment. Our results show that there is a positive correlation between nest abandonment and increasing temperature as well as a negative correlation between nest abandonment and increasing humidity. We also found that there were more abandonments in the shinnery oak prairie. The shinnery oak prairie climate experiences hotter temperatures and lower humidity, so we can assume that lesser prairie chickens in this region are more at risk with projected climate change. Though the effects of climate change are inevitable, our results can be used to help make important decisions to determine where to focus management efforts when preserving lesser prairie-chicken populations.

19. MOVEMENT RATES OF SWAINSON'S HAWKS FROM THE PLAINS OF TEXAS TO THE PAMPAS REGION OF ARGENTINA

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The Swainson's hawk (*Buteo swainsoni*) is raptor that breeds across the prairie grasslands of North America and is a species of conservation concern in many states. Each autumn the population migrates en masse from North America to their wintering grounds on the Pampas of Argentina, and returns in the spring. With a round trip distance that may exceed 22,000 km, this is one of the longest migrations known for birds of prey. Previous studies have utilized satellite telemetry to identify the wintering grounds and investigate migratory pathways and movements of Swainson's hawks. Yet- many relevant ecological questions still remain regarding the migration ecology of the species. Starting in 2012, we began attaching GPS Platform Transmitter Terminals to male and female Swainson's hawks nesting in the panhandle of Texas; our goal was to investigate their year-round ecology. These units provide 6 - 8 latitude and longitude coordinates with an 18 m accuracy, speed, heading, and altitude data on a daily basis. Data analyses are ongoing, but we will use these data to report gender-specific movement rates and routes of 24 individual Swainson's hawks during 2 autumnal migrations and 1 vernal migration.

20. BIRD DIVERSITY, VEGETATION, AND HOUSE PRICES IN LUBBOCK, TX

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Urban areas are increasing both in the United States and around the world. The increase of urbanization means wildlife is forced to use urban areas. Determining how homeowners value their urban landscapes could prove useful for understanding house prices and for improving wildlife habitat. The purpose of my study is threefold. First, I will compare bird diversity to vegetation composition, cover, and structure in neighborhoods across Lubbock, TX. Second, I will study how bird diversity and vegetation cover changes throughout the area. Finally, I will observe how house prices change when considering bird diversity and vegetation. I will achieve these objectives by collecting recently-sold house data in target neighborhoods with diverse demographics and then performing bird point count surveys and vegetation surveys at each recently-sold house. These results will have important management implications. In the Lubbock area these include knowing where high densities of bird diversity are located and the type of vegetation that is associated with those high diversities. General public outreach can also be performed, including informing residents of what types of birds can be found in their neighborhoods, what type of vegetation composition might best attract a variety of birds, and where, within the city, one could go in order to see interesting birds. Additionally the knowledge of how much people are willing to pay for an improved landscape with more trees and vegetation could inform homeowners how best to improve their landscape not only to increase house value but also to improve wildlife use.

21. PESTICIDES AND PREDATOR CUES: MULTIPLE STRESSOR INTERACTION PATTERNS THROUGH TIME

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Environmental factors and ecological stressors have been shown to modify pesticide toxicity when they co-occur. Typically, interactions are assessed at standardized exposure time points. Less attention has focused on how these interaction patterns may vary over time during a co-exposure period. In a previous study, we found that measured toxicity responses varied widely compared to toxic responses estimated from an independent action model across concentration gradients. The patterns were different among several classes of pesticides that had different mechanism of action. Here we report on how bluegill (*Lepomis macrochirus*) chemical cues affect toxicity of bifenthrin, fipronil, malathion, and thiacloprid to *Ceriodaphnia dubia* over a 96-h exposure period in which *C. dubia* mortality was monitored for multiple time points. For those pesticides that were previously found to have potentiation (fipronil) and antagonistic (bifenthrin and thiacloprid) interactions at 96-h, mortality patterns over time varied between the predator cue and pesticide combination and the pesticide alone. Typically, this variation increased over the exposure period and patterns varied among concentrations tested. The results demonstrate that interpretations of multiple stressor interactions may be dependent on time of monitoring over the co-exposure period. Toxicokinetic mechanisms may be responsible for driving this variation if stressors such as predator cues influence metabolic or uptake and elimination processes. These results also support the idea that monitoring responses to multiple stressors through time and use of integrated approaches will provide a better understanding of risk to aquatic organism

22. PIWI VS. DNA TRANSPOSONS: IDENTIFYING PIWI HOMOLOGS IN VESPERTILIONID BATS

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Of the two classes of transposable elements, DNA transposons and retrotransposons, DNA transposons have been found to have low activity in all studied mammals so far except for one family of bats, the vespertilionid bats including *Myotis lucifugus*. *M. lucifugus* and other vesper bats exhibit a recent increase in DNA transposon activity. P-element induced wimpy testis (PIWI) is a vital protein component of the pathway that acts to silence transposable elements via their interaction with a class of small RNAs (piRNAs). We propose that the increase in DNA transposon activity in vesper bats may be related to changes in PIWI expression. In this study, PIWI genes are examined bioinformatically in ten different bat genomes, including *Myotis lucifugus*. By analyzing the PIWI gene family, expression data and possible deactivations of these genes may be detected. Such pseudogenizations may play a role in allowing DNA transposon activity. Thus far in the study, full PIWI exon sequences have been difficult to obtain. However, some species do possess the full exon repertoire and partial sequences in other species indicate the PIWIs are present and they may or may not be functional. This could possibly be due to changes in the PIWI makeup of the gene family framework which could account for the increase in DNA transposon activity or because techniques used so far have not been successful in finding the full sequences. Deeper and more intense extraction methods will be used in this study to further examine these important elements.

23. TOOLS AND METHODS FOR ANALYZING FORMALDEHYDE IN THE MAMMAL FLUID COLLECTIONS AT THE NATURAL SCIENCE RESEARCH LABORATORY, MUSEUM OF TEXAS TECH

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The mammal collection at the Museum of Texas Tech is one of the largest and oldest in the state of Texas, with the fluid-preserved specimens serving as one as a primary resource for research. Over the last 20 years a majority of the specimens stored within the collection have been transferred from formaldehyde into ethanol for the continued safety and preservation of the specimens and to protect the health of the museum's staff. However, due to the long-term exposure of the specimens to formaldehyde, there is possibility that: 1) traces of formaldehyde may remain in fluid-preserved specimens, 2) formaldehyde may have leached into the replacement ethanol, and 3) off-gassing of formaldehyde may have occurred throughout the NSRL. To address the potential for formaldehyde exposure throughout the collection, 30 specimen jars, 8 mammal cases, and air samples were obtained from 6 rooms. Preliminary results indicate the presence of low-level formaldehyde contamination (0.01 ppm to 5 ppm) throughout the collection. Statistical tests are underway to determine if levels vary significantly between the different areas and from background (control) levels.

24. THE ROAD TO SUCCESS: PERCEPTIONS OF CAREERS IN NATURAL RESOURCES AND FACTORS INFLUENCING RETENTION

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The Bureau of Labor Statistics sees an increase in jobs within the field of natural resources within the next seven years, because baby-boomers are retiring and there is opportunity for job growth within this field. Recruiting and retaining individuals in this field has been challenging as there are many factors, both barriers and attractants that can influence these processes. Our work will investigate these processes by studying the perceptions of natural resource professionals with degrees that work in state and federal agencies, nonprofit organizations, and higher education institutions within the state of Texas. We will (1) evaluate what attracted natural resource professionals to their careers (2) assess the factors that have kept these individuals in this field (3) and identify the majority and minority-specific differences in elements influencing recruitment and retention into natural resource careers. This work will provide insights into diversifying the workforce in natural resource careers as the field continues to grow.

25. EICOSAPENTAENOIC ACID REGULATES BROWN ADIPOSE TISSUE GENE EXPRESSION AND METABOLISM IN HIGH FAT FED MICE

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Brown adipose tissue (BAT) is a thermogenic tissue, a key regulator of energy balance and a potential therapeutic target for obesity. We previously reported that eicosapentaenoic acid (EPA) reduced high fat (HF) diet-induced obesity and insulin resistance in mice, independent of energy intake. We hypothesized that these effects are mediated in part by BAT thermogenesis. Using mice fed HF or HF-EPA diets for 11 weeks, we demonstrated that BAT from HF-EPA mice expressed higher mRNA levels of thermogenic genes such as fibronectin type III domain containing 5 (FNDC5), peroxisome proliferator activated receptor gamma coactivator 1 alpha (PGC1 α) and uncoupling protein 3 (UCP3), compared to HF mice. EPA also induced expression of angiotensinogen (Agt) gene and other genes related to insulin sensitivity such as Glut 1 while downregulating arachidonate 5-lipoxygenase (ALOX5), an inflammatory biomarker. At the protein level, EPA upregulated uncoupling protein (UCP) and downregulated fatty acid synthase (FAS). Thus, EPA exerts dual effects on adipose tissue depots, by reducing WAT inflammation and lipid accumulation, while activating BAT thermogenesis and reducing lipogenesis. In conclusion, EPA exerts differential tissue specific effects to reduce obesity-associated metabolic disorders. Further molecular studies in cultured brown adipocytes are being conducted to dissect direct effects of EPA on brown fat.

26. GUADALUPE BASS (*MICROPTERUS TRECULII*) POPULATIONS RESPONSE TO POTENTIAL HYDROLOGIC IMPACTS OF URBANIZATION WITHIN THE COLORADO RIVER BASIN

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Major alterations to the hydrologic regime have occurred throughout the Colorado River Basin 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 characterize the degree of disturbance to the portions Colorado River Basin currently or historically inhabited by Guadalupe Bass and evaluate the relationship between hydrologic alteration and other disturbances within the basin. In this portion we used Indicators of Hydrologic Alteration (IHA) method to calculate flow metrics for select streams for two periods, pre-1979 and post-1979. We used U.S. Geological Survey stream gauge data, U.S. Geological Survey National Hydrography data, U.S. Geological Survey North American Landscape Characterization data and Texas Parks and Wildlife ecoregion data to evaluate changes in land use and land cover within the watersheds of the selected streams. We will present results describing the relationships between these two datasets to evaluate how the relationships vary with stream order, watershed area, and degree of groundwater influence. This work is the first part of a larger study evaluating changes in Guadalupe Bass populations throughout the Colorado River Basin over the past 35 years. Comparison of the present flow regime 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.

27. EFFECTS OF CADMIUM AND DIET ON FEEDING, GROWTH, BEHAVIOR AND MACRONUTRIENT CONTENT IN *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 assess a number of sublethal responses related directly to bioenergetics. We evaluated feeding and growth rate, behavior and macronutrient content in the pond snail *Lymnaea stagnalis* exposed to cadmium and fed diets differing in nutritional content. Hatchlings were fed either lettuce or turtle pellets, and exposed to 5, 10, and 20 ppb cadmium for 12 days. Length and weight were measured at the beginning and end of the test. The amount of food eaten and behavior (number of snails above waterline and on the food) were determined every two days. Total lipids, proteins and carbohydrates were biochemically measured at test end. Growth coefficients based on length and weight were significantly higher for snails fed pellets ($p < 0.001$). In addition, snails fed pellets and exposed to higher Cd had significantly

smaller growth coefficients than those exposed to lower Cd ($p < 0.05$). For feeding rate, there was an interaction between treatments and time for both diets suggesting that the groups' rates were changing over time in different ways. Total carbohydrates and lipids were higher for snails fed pellets while the protein content was not significantly affected by Cd or diets. This study represents the first time a bioenergetics-based approach has been used to better detect and understand potential ecotoxicity of chemical stressors to freshwater gastropods.

28. METABOLOMICS AND OPTICAL IMAGING SHOWS TISSUE SPECIFIC MITOCHONDRIAL OXIDATIVE STRESS AS EARLY BIOMARKERS OF POLYCYSTIC OVARY SYNDROME

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Polycystic ovary syndrome (PCOS) is associated with metabolic and endocrine disorders in women of reproductive age. Causation and onset of PCOS are still unknown and only diagnosed after puberty. The objectives of this study were to quantify the tissue-specific (kidney, heart and ovary) mitochondrial activity during the progression of PCOS from 8 to 16 weeks in a prenatally glucocorticoid treated (cort) mouse model. We employed nuclear magnetic resonance (NMR)-based metabolomics and the complementary optical imaging technology to examine the mitochondrial function and redox state. Nuclear magnetic resonance (NMR) spectroscopy analysis of kidney showed 123% decrease in succinate and 48% increase in fumarate from 8 to 16 weeks old cort mice. Optical imaging revealed significant changes in the mean NADH redox state (RR) in a tissue specific manner during the same time course. Kidneys from cort-mice revealed more oxidized respiratory chain in 8 (50%) vs. 12 (17.5%) and 16 (15%) weeks, whereas ovaries showed gradual changes in the RR during the time course as compared to controls at the same age. In the heart, cort mice exhibited a similar increase (35%) in the RR in all three ages. Combined approaches of optical imaging and NMR analysis provide the first glance into early oxidative stress biomarkers as metabolic disturbances associated with PCOS progression.

29. HYDROGEN PEROXIDE SIGNALING REDIRECTS CARBON FLOW FROM CELLULOSE SYNTHESIS TO TREHALOSE AND STARCH SYNTHESIS IN THE IMMATURE MUTANT OF GOSSYPIUM HIRSUTUM

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The *immature* mutant of upland cotton (*Gossypium hirsutum* L., $2n=4x=52$) is so-named due to a severe deficiency in the cellulosic secondary cell wall (SCW), conferring immature, weak fibers, significantly decreasing yield. Previously implicated as a developmental signal controlling the onset of SCW synthesis, hydrogen peroxide (H_2O_2) was found to be significantly altered in developing mutant fibers beginning after the transition from primary to secondary wall synthesis, causing spurious activation of hormonal and sugar signaling pathways. A combination of molecular, biochemical, and physiological data demonstrate that the prolonged accumulation of H_2O_2 in mutant fibers causes a redirection of carbon flow away from cellulose synthesis towards trehalose and starch synthesis. Understanding H_2O_2 homeostasis in developing cotton fiber could potentially lead to the identification of extremely valuable biotechnological targets for manipulation of carbon allocation to increase fiber production for uses in the textile industry, or rather to increase the nutritional value of cotton seed used by the agricultural industry.

30. 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.

31. TISSUE SPECIFIC INDUCTION OF ChREBP ISOFORMS IN CARBOHYDRATE REFEED MICE

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Carbohydrate response element binding protein alpha (ChREBP- α) is a transcription factor involved in carbohydrate induced de novo lipogenesis. Recently, a novel isoform (ChREBP- β) has been discovered and the purpose of this study was to determine the effect of different carbohydrates on ChREBP- β transcriptional activity. Male mice were fasted for 24 hours and re-fed a high glucose, sucrose, or fructose diet for 12 hours. Tissues were collected to assess changes in lipogenic and gluconeogenic gene expression as well as ChREBP- α and ChREBP- β induction. HEK293 cells were transfected with plasmid DNA expressing either ChREBP- α or ChREBP- β and treated with either 25mM glucose or fructose for 24 hours and changes in lipogenic gene expression was assessed. ChREBP- α was not induced with carbohydrate refeeding, in fact it decreased after all three diets whereas ChREBP- β increased in all tissues assessed except muscle. Sucrose refeeding caused the largest increase in ChREBP- β expression followed by fructose, then glucose (24.4 \pm 11.1, 17.8 \pm 9.5, and 10.1 \pm 3.2 fold increase, respectively vs. fasting). ChREBP- β expression was also associated with lipogenic gene expression. SCD1 expression increased 8.6 \pm 4.0, 8.4 \pm 3.0, and 4.4 \pm 1.3 fold with sucrose, fructose, and glucose refeeding respectively. ChREBP- α and ChREBP- β can be detected separately and their induction is detectable in the liver and other peripheral tissues of carbohydrate re-fed mice. ChREBP- β expression appears to be responsible for carbohydrate-induced lipogenic gene induction and not ChREBP- α .

32. EXPRESSION AND CHARACTERIZATION OF A KINASE FROM CHILO IRIDESCENT VIRUS

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The type species for the family *Iridoviridae*, Chilo iridescent virus (CIV) induces mortality and deformity in cotton boll weevils, reduces aphid populations, but does not infect mammalian cells. Genes of this entomopathogen have potential as plant-incorporated protectants against insects resistant to chemical pesticides and other microbial insecticides. The Bilimoria laboratory has identified a CIV serine / threonine kinase gene designated ISTK (iridovirus s/t kinase) from CIV. Identical to ORF 389L in the CIV genome, an expression vector with the complete 1236 base pair ISTK gene with either N-Terminal or C-Terminal histidine tag has been transformed into *Escherichia coli* cells. Overexpressed at 16°C for 6 hours, this recombinant polypeptide has been detected by staining and immunoblotting with two different antibodies. Its identity has confirmed by MALDI-TOF. Activity of full-length ISTK is being characterized by in-vitro kinase assays. Currently *E. coli* produced ISTK demonstrates statistically significant kinase activity over negative controls including Staurosporine-treated ISTK and Bovine Serum Albumin. Apoptotic capabilities will be determined by blebbing and DNA fragmentation experiments in insect tissue culture. Characterization of this protein is the first step in determining manipulation of signal transduction pathways by this viral gene.

33. DIFFERENTIAL REGULATION OF ADIPOKINE LEVELS AFTER BARIATRIC SURGERY

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Bariatric surgery is known to cause significant weight loss, reduction in insulin resistance, cardiovascular disease and mortality. We hypothesized that adipose and systemic inflammation will be decreased post bariatric surgery. Our objective was to study changes in adipokine levels following bariatric surgery. We recruited patients undergoing Roux En Y gastric bypass and laparoscopic gastric band placement. Demographic data and both serum and adipose tissue samples were collected at the time of surgery, 2 weeks and 6 months post operatively. Human adiponectin, Tumor Necrosis Factor- α (TNF- α), leptin and Monocyte Chemoattractant Protein-1 (MCP-1) ELISAs were used to measure levels of these adipokines in serum and/or adipose tissues. Percentage changes in adipokines were calculated from time of surgery to each time point after surgery. There was a significant increase in adipose adiponectin at each post-surgery time. Serum adiponectin showed an

increasing trend by 6 months, but was not significant. Serum leptin, TNF α and MCP-1 all showed decreasing trends from time of surgery to 6 months post surgery, but differences were not statistically significant. The percentage reduction for MCP-1 at 6 months was significantly higher than for TNF- α . These findings suggest that serum and adipose adipokine levels are differentially regulated by bariatric surgery. Additional studies are necessary to determine how these changes in tissue and circulating adipokine levels relate to various bariatric surgery outcomes.

34. HUMAN DIMENSIONS OF URBAN WATER BODY USAGE IN LUBBOCK, TEXAS

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As urban areas expand to accommodate a growing population, urban planners are tasked with building ecological and public friendly Urban Green Spaces. These same spaces usually provide habitat to urban-dwelling wildlife. Historically, water bodies with urban green spaces are intended for people to perform many different recreational activities. The purpose of this study is to identify recreational use of urban water bodies in the absence of swimming. In Lubbock, Texas, urban lakes have been created for flood control and integrated into urban green spaces for aesthetic enhancement. While these urban green spaces are intended for outdoor recreational activity, city ordinance does not allow swimming in the lakes. In the absence of swimming I expect to find that people use these areas most often for personal exercise and to walk pets. This study will be performed over a 24 months period. Multiple visual site surveys will be conducted in six months increments to address variation between seasons: spring and summer, fall and winter. Surveys will occur Sunday through Saturday and will capture hourly time points from 6 a.m. to 9 p.m.. During these surveys I will visually assess and capture recreational activities in progress and wildlife presence at 24 pre-selected sites. The results of this study can aid direction of future studies on wildlife impact due to human activity presence in UGS. In addition, knowledge of UGS amenity preferences by public users can help urban planners to enhance management while preserving ecological services wildlife utilize in such spaces.

ORAL (UNDERGRADUATE)

35. THE EFFECTS OF SOIL NITROGEN AVAILABILITY ON THE ALLOCATION OF NITROGEN TO LEAF PROCESSES FOR AN INVASIVE GRASS, *PHALARIS ARUNDINACEA*, AND NATIVE *CAREX* SPECIES

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Wetlands that receive a high nitrogen load are vulnerable to invasion by non-native species whose nitrogen-use strategies are favored by such conditions. The invasive grass, *Phalaris arundinacea*, thrives in nitrogen-rich sites that once supported *Carex* species. We hypothesized that the strategy of *P. arundinacea* to allocate nitrogen to photosynthetic enzymes and less to storage at high nitrogen levels. However, *Carex* species may maintain photosynthesis and be more competitive at low nitrogen by relying on nitrogen storage and preferential allocation of nitrogen to photosynthesis. We supplied plants of *P. arundinacea*, *C. stricta*, and *C. lacustris* with a complete nutrient solution containing 15 mM nitrogen for 7 weeks followed by a solution containing 0.15 mM nitrogen for 7 weeks. After each treatment period, we measured photosynthetic parameters and determined the soluble protein content (storage and metabolic), and nitrate content of leaves. After 7 weeks of high nitrogen availability, *P. arundinacea* had the highest and *C. lacustris* the next highest carboxylation capacity, indicating strong allocations of nitrogen to photosynthesis. Also, *P. arundinacea* accumulated more nitrate than the *Carex* species. Nitrogen deprivation significantly lowered the carboxylation capacity and soluble protein in *P. arundinacea*. Leaf nitrate content for *P. arundinacea* was reduced under nitrogen deprivation, whereas little change in nitrate occurred for the *Carex* leaves. We conclude that nitrogen deprivation causes a shift in leaf nitrogen allocation from photosynthesis and nitrate accumulation to other processes in the plant for *P. arundinacea*, potentially reducing its competitive advantage over *Carex* species.

36. DEVELOPMENT OF DOCUMENTATION SYSTEM USING A HIGH-END DSLR CAMERA

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Costly instruments can limit the variety of laboratory techniques available to small-budget universities. High-end DSLR cameras, however, possess high detection capabilities and are versatile in a laboratory setting. A Canon EOS 5D Mark II camera equipped with a Canon EF 3.5mm f/1.4L USM wide angle lens fixed in a tailored blackbox was utilized for

capturing beetle luciferin bioluminescence, fluorescent agarose gels, luminol-based chemiluminescent EMSAs, and white-light transluminescence used for techniques such as Western blots and polyacrylamide gels. Standard curves imaged by the DSLR camera were processed and analyzed using Adobe Photoshop and ImageJ. The optimum setting for imaging each assay technique was determined from that which produced the most linear dilution curve and lowest projected detection limit. When compared with the standard curves produced by the traditional imagers, it was evident that the DSLR produced more linear data and therefore performed superior to these imagers. This documentation system is easily mastered, yields better data quickly, and is significantly more affordable than purchasing multiple, less adaptable instruments – making it more practical, even for universities that are unable to afford commercial documentation systems.

ORAL (GRADUATE) CELL & MOLECULAR BIOLOGY

37. EVALUATION OF A MODIFIED VIRAL INSECTICIDAL GENE USING AN *AGROBACTERIUM*-MEDIATED TRANSIENT EXPRESSION SYSTEM IN TOBACCO

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Insect pests are a serious threat to agricultural productivity. Use of chemical pesticides, the predominant control method thus far, has resulted in environmental damage, pest resurgence, and negative effects on non-target species. Genetically modified (GM) crops offer a promising alternative, and *Bacillus thuringiensis* toxin genes have played a major role in this respect. However, to overcome insect tolerance issues and to broaden the target range, it is critical to identify alternative insecticidal toxins working through novel mechanisms. Our group has identified a kinase gene from Chilo iridescent virus (CIV) that has insecticidal activity. The CIV toxin, expressed in yeast systems, induces 50% mortality in cotton aphids and 100% mortality in green peach aphids. Attempts to transform and express this gene in plants yielded viral kinase-specific RNA but no protein. Expression of foreign genes in plants is complicated by codon usage, mRNA instability, translational efficiency, and proteolytic degradation. Therefore, the viral toxin gene was codon optimized to favor translation and stability in planta. The results of transient expression studies of this modified gene in tobacco and aphidicidal activity of the gene product will be presented.

38. EICOSAPENTAENOIC ACID REDUCES HIGH-FAT DIET-INDUCED INSULIN RESISTANCE BY ALTERING ADIPOSE TISSUE GLYCOLYTIC AND INFLAMMATORY FUNCTION

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We previously reported Eicosapentaenoic Acid (EPA)'s ability to prevent high-fat (HF) diet-induced obesity, insulin resistance, and inflammation. In this study, we dissected mechanisms mediating anti-inflammatory and anti-lipogenic actions of EPA, using histology/ immunohistochemistry, transcriptomic and energetic analyses of adipose tissues from HF and HF-EPA fed mice, or 3T3-L1 adipocytes treated with or without EPA. Microarray and real time PCR analyses of adipose tissue from these mice showed that EPA decreased expression of genes associated with cell proliferation, apoptosis, adipogenesis and glucose metabolism (namely Fasn, Srebf1, Cebpa, Ncoa2, and Axin1). Preliminary extracellular flux studies indicate changes in glycolysis in differentiated 3T3-L1 adipocytes treated with EPA, compared to those treated with palmitic acid (PA) alone or with EPA. These results are consistent with increased fatty acid oxidation-related metabolites in gonadal fat after EPA supplementation. Histology and immunohistochemistry results showed a significantly lower mean adipocyte size and macrophage infiltration in mice fed a HF-EPA diet vs. HF, indicating that EPA prevented HF-diet induced adipocyte inflammation and hypertrophy. In conclusion, our studies demonstrate that EPA ameliorates glucose homeostasis at least in part by reducing adipose tissue inflammation, glycolysis and lipid accumulation. Grant support: USDA, AHA and TTU (COHS and OVPR).

39. FOOD DEPRIVATION AND STRESSOR EXPOSURE ALTER TECTAL CRF CONCENTRATIONS IN AFRICAN CLAWED FROGS (*XENOPUS LAEVIS*)

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The peptide CRF alters visually guided prey capture in anurans. A physiological role for CRF in regulating visually guided behavior is suggested by the presence of CRF neurons and CRF R1 receptors in the anuran optic tectum. Whether tectal CRF neurons respond to changes in energy balance or stress is unknown. We examined the effects of food deprivation and stressor exposure on tectal CRF content in *X.laevis*. For the food deprivation studies, frogs received no food or normal food rations for 8 d. For the stressor studies, frogs were untreated or exposed to ether vapors (1 min) or shaking stress (4 h). CRF content of the telencephalon (Tel), optic tectum (OT), hypothalamus/ thalamus (H/T), and the brainstem (BS) was measured using a homologous radioimmunoassay. The rank order for CRF concentrations in each brain area of controls was H/T > OT > Tel > BS. Food deprivation decreased CRF OT content but did not alter CRF content of the Tel or H/T when compared to controls. Interestingly, CRF content of the BS increased in response to food deprivation relative to controls. Exposure to a shaking stressor increased CRF in the H/T but did not alter CRF in the OT. In contrast, exposure to ether elevated CRF in the OT relative to untreated controls but had no effect on CRF content in the H/T. These data suggest that tectal CRF neurons may play a role in modulating visually guided behavior during stress and in response to changes in energy balance.

ECOLOGY

40. DO RIVER-RESERVOIR INTERFACES SERVE AS SURROGATE NURSERIES FOR FLOODPLAIN-DEPENDENT RIVERINE FISHES?

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Anthropogenic modification to riverine systems has reduced access to important off-channel nursery habitats. Some species utilize these floodplain habitats during early life history. The river-reservoir interface (RRI), a transitional zone between lentic and lotic habitats, may provide surrogate nursery habitats for these species. We sampled ichthyoplankton assemblages in riverine and RRI off-channel and main channel habitats in the Trinity River system of east Texas to compare species composition and abundance in these different habitat types and evaluate the influence of abiotic and physicochemical characteristics on ichthyoplankton assemblages. Ichthyoplankton was sampled using light traps and paired push nets deployed off jet-powered kayaks during February-July 2013 and 2014. Over 30,000 larval fishes were collected, representing 11 taxa. A few taxa were dominant at all sites, however, less common ichthyofauna such as moronids, centrarchids, and Freshwater Drum were captured more frequently in RRI habitats. In general, larval fish abundance, species richness, and species diversity were greater in the RRI off-channel habitats than other habitat types. The duration and size of connection to the main channel best explained species richness, diversity, and overall abundance in RRI off-channel habitats. Our results suggest RRI habitat may serve as a surrogate nursery for some species.

41. DIFFERENCES IN NEOPHOBIA BETWEEN CANE TOADS FROM INTRODUCED AND NATIVE POPULATIONS

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For species moving into new environments, locating and using unfamiliar resources is crucial for survival. The cane toad (*Rhinella marina*) has been successful in many countries worldwide, persisting in both urban and rural landscapes. Given that animals exploiting urban habitats are confronted with novel feeding opportunities, individuals in those areas are expected to exhibit reduced neophobic tendencies compared to individuals in rural populations. Additionally, individuals persisting in introduced populations are expected to be less neophobic than individuals in native populations, taking advantage of novelty as their range expands. To investigate such predictions, we examined the response to novel prey and a novel object in native toads in Panama and introduced populations (urban and rural) in Florida. Toads were tested in an arena with novel or familiar

prey and later with a novel object next to familiar prey. We found differences in response to novelty between cane toads in different habitats and ranges. Most introduced individuals from both urban and rural habitats consumed novel prey with no difference in latency to eat between prey types. Few native toads, however, consumed any prey during trials, spending most of their time moving about the arena. When familiar prey was presented near a novel object, more than half of the introduced toads ate, but no native individuals ate. This study emphasizes the importance of behavior as a mechanism used by invasive species to exploit novel resources and successfully colonize new environments.

42. DETECTION OF PREDATORY FISH KAIROMONES BY OVIPOSITING MOSQUITOES

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Many ovipositing species offer little parental care to their offspring other than selecting a site to lay their eggs. Therefore, selecting a safe and resource-rich habitat for their offspring is crucial to the fitness in many aquatic insects and amphibians. Determining the mechanisms that are used to select an adequate site is critical to understanding the dynamics of habitat selection. One possibility is the use of chemical cues. Previous research has found that ovipositing mosquitoes have the ability to detect chemical cues of predators that prey on larval offspring. In this context, we conducted two experiments to investigate whether *Culex* mosquito species detect fish kairomones when selecting an oviposition site. We conducted two simultaneous experiments. One consisted of a paired test with eight pairs of pools, controls and mosquitofish (*Gambusia affinis*). The second had the same experimental set-up but used green sunfish (*Lepomis cyanellus*) as the fish treatment. Only fish conditioned water was used in the experimental pools. *Culex* egg rafts were removed daily, reared to fourth instar, and identified to species. *Culex restuans* avoided *G. affinis* treatments, ovipositing 206 egg rafts in the control and 32 in the *G. affinis* treatments. *Culex pipiens* did not show preference to either the control or fish treatments. Our findings display evidence that some species of ovipositing mosquitoes are clearly detecting fish kairomones to avoid oviposition in sites that contain fish, and results are species specific for fish.

43. ROOST ENSEMBLES OF INSECTIVOROUS BATS DIFFER IN RESPONSE TO COFFEE AGRICULTURE IN SOUTHEAST ASIA

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Ecological traits of species are key determinants of responses to habitat loss and alterations. For instance, roosting ecology of bats is associated with habitat use. However, relationships between roost use, tropical bat diversity, and habitat transformation remain unclear. We hypothesized that obligate plant-roosting bats, which use plant roosts exclusively, are more vulnerable to vegetation simplification than facultative plant-roosting and cave-roosting bats. To test our hypothesis, we used harp traps to survey insectivorous bat assemblages at nine localities of three land use types in a coffee-forest landscape of Sumatra, Indonesia from 2011-2012. Eight microhabitat measurements were taken to assess the correlations between vegetation structure and species composition. Abundance and species richness of obligate plant-roosting, and abundance of facultative plant-roosting ensembles were significantly lower in coffee plantations than in forests. No significant difference was detected in cave-roosting ensembles and species richness of facultative plant-roosting ensembles. Although more *Kerivoula* and *Murina* species, which are obligate plant-roosters, were recorded in forests than in plantations, the overall species compositions were not statistically different among land use types. This is probably because most study localities were dominated by *Hipposideros* and *Rhinolophus* species, which are primarily cave and facultative plant roosters. The variation in species compositions was partially explained by the presence of big logs (diameter > 30 cm) and emergent trees, and shade levels. Our study indicates roosting ecology plays a critical role in the responses of Southeast Asia's insectivorous bats to coffee agriculture.

44. YOU “ROT” MY WORLD!: HOW DECOMPOSITION INFLUENCES LITTER FLAMMABILITY

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Fire is a powerful ecological phenomenon shaping vegetation distribution and structure across many biomes. Plants have the ability to influence the nature of fire through differences in their traits, but elucidating the specific traits that influence flammability and determining the nature of that influence has yet to be accomplished. Recent work has shown that leaf size, by influencing litter density, has strong effects on flammability: large leaves lead to less dense and more flammable litter. Decomposition, by changing the leaf particle size through time, will alter bulk density and thus influence fire behavior. However, no work as yet addressed particle size distribution. Volatiles are thought to influence flammability, but no actual

study as looked at how specific chemicals influence spread rate. This proposal will address a critical research need to obtain better mechanistic understanding of the dynamics of litter fuel flammability and fire behavior under current and possible future climate scenarios.

The study was conducted in the mixed-conifer forest of Sequoia and Kings Canyon National Parks, California, USA. Small samples of leaf litter were collected during summer 2012 from eight tree species representative of this system. They were placed in litter bags at 6 locations (3 altitudes, 2 aspects), and left to decompose for 1 and 2 years. Preliminary results show substantial differences in moisture retention and in particle size distribution among species. These results highlight the potential for some species to influence the fire environment, increasing the likelihood of feedback effects on community assembly and on evolutionary trajectories.

45. RELUCTANCE TO SING: CHANGES TO VEERY DUSK CHORUS ASSOCIATED WITH INDIRECT PREDATOR CUES

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In Passerines, song serves as a vital component of communication, either to elicit a mate or defend a territory. In the presence of a predator, however, vocal communication can be detrimental, making a bird more susceptible to the risk of predation. Singing at dusk, when light levels are diminished, can exacerbate this risk. As an adaptive means of assessing risk, organisms can utilize heterospecific eavesdropping, via the acquisition of information regarding the surrounding environment, to make informed decisions. I am investigating whether a diurnal Passerine, the Veery (*Catharus fuscescens*), eavesdrops on indirect predator cues, the high-see alarm call of the Tufted Titmouse (*Baeolophus bicolor*), at dusk and consequently modifies singing behavior to diminish potential predation risk. These behavioral modifications can be characterized by a reduction in total song output and the number of singing bouts post sunset. Currently, 14 paired trials have been collected. To date, research into Passerine dusk chorus, particularly as it relates to predation risk, is negligible. This study aims to contribute to this underrepresented field by offering a unique perspective into predator-prey interactions as they relate to vocal communication.

EVOLUTIONARY BIOLOGY

46. SENSORY ECOLOGY OF MATING BEHAVIORS IN THE INFRAORDER CULICOMORPHA (DIPTERA)

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Mating behavior consists of a sequential process that includes finding a potential mate, courtship and, if males are successful, copulation. These behaviors are mediated by a variety of signals produced in multiple sensory modalities and are critical for mate finding, courtship and copulation. We reviewed the diverse behaviors, signals and sensory organs involved in mating across lineages in the infraorder Culicomorpha (Diptera) which comprises eight families including both biting and non-biting midges (total of over 562 valid genera that include an estimated 18,103 species). We performed an exhaustive literature review compiling over 300 papers that address the mating behavior and sensory ecology in this group. Here we discuss the morphological and behavioral traits related to different mating strategies to provide an integrated perspective about mating across species of Culicomorpha families. Although there is high diversity of mating behaviors across families in this group, swarming is the most common and the ancestral mating strategy in this clade. Other mating behaviors (substrate based mating and pupal guarding) have evolved independently several times as adaptations to physiological conditions of individuals and environmental constraints they experienced. Acoustic, visual or chemical mating signals are used in different species, and each sensory modality is correlated with particular morphological features in their sensory system. In this study we ultimately reveal associations between mating behaviors, signals and sensory organs that have evolved together in Culicomorpha insects and highlight gaps in current knowledge suggesting further research critical to understanding the evolutionary ecology of mating strategies in this group.

47. PHYLOGEOGRAPHY AND THE ORIGIN OF FREE-RANGING ELK (*CERVUS CANADENSIS*) IN TEXAS

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The historic range of Elk (*Cervus canadensis*) included much of the western United States. Natural distributions of this species decreased substantially in the early twentieth century presumably eliminating the Texas population. In the last 20 years, several herds of free-ranging elk have appeared in the Trans-Pecos region of Texas. It is not known if these herds were the result of introduction from captive herds, or if they represent natural migrants from New Mexico or Colorado. The main objective of this study is to determine the origin and genetic affinities of free-ranging *C. canadensis* in Texas. DNA sequences from the mitochondrial cytochrome-*b* locus will be used to generate haplotype networks to compare *C. canadensis* samples from Texas with those from New Mexico, and Colorado. In addition, six microsatellite loci will be used to examine the phylogeography and genetic divergence of the various aforementioned populations, which will assist in determining the origin and the relatedness of the *C. canadensis* herds in Texas. Preliminary results suggest that most individuals from Texas form a monophyletic group.

48. ON THE IDENTITY OF *PEROMYSCUS* ON GRAND MANAN ISLAND, NEW BRUNSWICK, CANADA

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Grand Manan Island (GMI) is the largest island (656 km²) in the Grand Manan Archipelago and is situated 15 km off the southern coast of New Brunswick in the Bay of Fundy, Canada. A series of 23 deer mice, *Peromyscus maniculatus*, collected from GMI in September 1905 was subsequently described as the subspecies, *P. m. argentatus*, by M. Copeland and M. L. Church in 1906. In studies examining the molecular systematics and morphological variability in mainland and island forms of *P. maniculatus* in Atlantic Canada, we collected material to re-evaluate the taxonomic status of *P. m. argentatus*. Surprisingly, our molecular genetic studies have revealed the presence (mitotype) of the white-footed mouse, *P. leucopus*, on GMI. This is the first reported occurrence of *P. leucopus* for the province of New Brunswick and confirms the need to reassess the taxonomic validity of *P. m. argentatus*. Our research also highlights the importance and utility of molecular systematics in identifying morphologically cryptic species. The natural history, ecology, and wildlife management issues pertaining to the discovery of *P. leucopus* on GMI are also discussed.

49. SPECIES DIVERSITY IN THE GENUS *CALOMYS* (RODENTIA: SIGMODONTINAE)

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The genus *Calomys* (Rodentia, Sigmodontinae) is a small granivorous rodent with a wide distribution in South America. Several species in the genus are recognized as reservoirs for highly pathogenic viruses, like Arenaviruses and Hantaviruses. The general patterns of diversity, species range limits, and phylogenetic relationships among members of the genus have been the subject of rigorous debate. In part, this is the result of limited sampling of specimens and a scarcity of molecular data. The goal of this presentation is to highlight the diversity, phylogeny, and species boundaries of the genus. To do so, we present nearly double the available sequences of a mitochondrial Cyt-*b* marker and added from more than 20 localities in an attempt to provide maximum geographical coverage of the genus. The results show that within species diversity is much higher than that reported before, and sister relationships among a few species are resolved with high bootstrap value. In an attempt to more adequately determine the diversity of the genus, species boundaries are tested with more robust single locus species delimitation method, such as the generalized mixed Yule coalescent (GMYC) model. These results are contrasted with the currently accepted patterns of diversity in the genus and will be presented here.

50. A PHYLOGENETIC ASSESSMENT OF THE SUBFAMILY NEOTOMINAE (RODENTIA: CRICETIDAE) USING COMBINED MOLECULAR DATA

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Multiple studies have examined the Subfamily Neotominae utilizing morphological, allozyme, or karyotypic data, as well as mitochondrial and nuclear DNA sequences. Various taxonomic arrangements have resulted, including several interpretations as to the number of tribes that should be recognized within this subfamily as well as relationships of genera within each tribe. Relationships within this subfamily have been difficult to resolve, most likely due to a rapid radiation event from their common ancestor and accumulation of few phylogenetically informative characters, paucity of taxa in studies, lack of congruence among data analyses, etc. have further complicated interpretations of phylogenetic relationships in this group of rodents. Despite the wealth of knowledge available for the Neotominae, branching patterns and relationships within each tribal lineage remain unresolved. Most studies which have focused on this group of rodents provided support for 4 and in some cases 5 tribes; however no two studies have provided the same results on the classification of these rodents at the tribal level. The most recent study suggested the recognition of 4 tribes (Baiomyini, Neotomini, Ochrotomyini, and Reithrodontomyini) based on DNA sequence data for one mitochondrial and two nuclear genes, however this study did not include several genera and species groups. This study examines several hypotheses for tribal affiliations for this subfamily using one mitochondrial and 5 nuclear genes to resolve the phylogenetic positions for genera whose relationships remain controversial.

51. MOLECULAR GENETICS OF COLD TOLERANCE VARIATION AMONG NATURAL POPULATIONS OF *POPULUS BALSAMIFERA* ACROSS THE GROWING SEASON

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Boreal forest trees such as *Populus balsamifera* exhibit high levels of population differentiation in quantitative traits of ecological importance. Although ample study has been conducted to understand winter survival strategies in plants, we currently lack an understanding of how species survive through freeze events during the active growing season. In this study, intraspecific variation in the freezing point and freeze damage (LT50) of Balsam poplar leaves was assessed using the electrolyte leakage assay (EL) and supercooling assay. LT50 was much lower than the freezing point, indicating that this species is likely to tolerate freezing during the growing season. Freezing tolerance showed clinal and temporal variation across the latitude of origin and growing season months, respectively. To identify the molecular basis of this variation we surveyed nucleotide variation in 6 members of the poplar CBF gene family. We compared phenotypic variation in freeze tolerance to genetic variation in putative genes and to patterns of differential gene expression. CBF2 showed strong genetic differentiation ($F_{ST}=0.248$) and a clinal pattern of change in minor allele frequency. Although all 6 CBF genes were cold inducible, they showed varying patterns of expression during the growing season. Overall, growing season appeared as an important determinant of foliar cold tolerance, evident by a strong latitudinal difference in freeze tolerance and gene expression pattern only in August and September. Presence of such strong latitudinal clines appears to be a threshold phenomenon and suggests an interaction between shortening of day length and lowering of temperatures in freeze induction.

52. MOLECULAR PHYLOGENETICS OF THE *NEOTOMA MEXICANA* SPECIES GROUP (VERTEBRATA: MAMMALIA: RODENTIA: CRICETIDAE) IN MESOAMERICA: EVIDENCE FOR RECOGNITION OF *N. FERRUGINEA* TOMES 1861

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The evolutionary history of the Mesoamerican highlands has been shaped by past geological and climatic events including the rise and fall of the Isthmus of Tehuantepec. Such events in the Quaternary have influenced in the current regional patterns of biodiversity. In order to understand the relative impacts of these historical events on diversification in montane taxa in

Mesoamerica, this study used phylogenetic analyses of the mitochondrial cytochrome-*b* gene from members of the *Neotoma mexicana* species group. Samples of *N. isthmica*, *N. mexicana*, and *N. picta* formed 3 well-supported clades, including a clade containing samples from southern Mexico and Central America that historically have been referred to as *N. ferruginea*, *N. isthmica*, and *N. mexicana*. Based on the monophyletic nature of this clade, magnitude of genetic divergence from other species of woodrats, criteria set forth in the genetic species concept, and the rule of priority of zoological nomenclature, individuals from southern Mexico, Guatemala, and El Salvador should be referred to as *N. ferruginea*, and *N. isthmica* should be subsumed into *N. ferruginea*. The phylogenetic pattern observed within this group was similar to that of other vertebrate taxa co-distributed in the region south of the Trans-Mexican Neovolcanic Belt and the highlands of Chiapas, Mexico and Nuclear Central America.

53. PHYLOGENETIC RECONSTRUCTIONS OF *DERMANURA*: INCONGRUENCE OF MULTIPLE MARKERS

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Morphological studies have failed to resolve the number of, and relationships among, species within the genus *Dermanura* (Chiroptera: Phyllostomidae), with morphologically based species delimitations ranging from one to ten. It is unclear to what extent complex evolutionary histories and ancient or ongoing patterns of gene flow contribute to this uncertainty. Recent evaluation of the Cytochrome-*b* gene has recovered eleven statistically supported monophyletic species-level groups which were generally correlated with morphology. Because of a common lack of congruence among previous morphological methods for many taxa, we used the genetically defined monophyletic bat genus *Dermanura* to assess congruence among previous morphological data with mitochondrial and nuclear datasets (amplified fragment length polymorphisms (AFLPs) and microsatellites). Morphological and mitochondrial DNA datasets were found to be incongruent with both nuclear datasets. Notably, a previous allozyme study (Koop and Baker 1983) found very few fixed differences, but considerable shared polymorphisms, among species of *Dermanura*. Contrasting results among datasets may reflect incomplete lineage sorting at the nuclear level (i.e., microsatellites) or reticulated evolution of sympatric populations (i.e., AFLPs). In an effort to further diagnose the lack of congruence among these datasets, and to qualify the potential role of gender-biased life history characteristics in shaping these patterns, future work will incorporate sequence data from paternally transmitted Y-chromosome.

54. IS ZONADHESIN A USEFUL MOLECULAR MARKER FOR DETERMINING PHYLOGENETIC RELATIONSHIPS AMONG MAMMALIAN ORDERS?

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The reigning paradigm of cellular biology suggests that structure determines function with regard to protein interactions. Molecules that are directly involved in reproduction are often subject to rapid evolutionary change. Zonadhesin (*ZAN*) is a multi-domain sperm protein that is crucial in species-specific fertilization. The mRNA for this protein spans more than 7 kb in most taxa with three domains that are directly related to the adhesion function of the protein, including a hemostatic glycoprotein called von Willebrand D (VWD) domain, mucin, and a receptor component. Mammalian VWD domains are highly variable between taxa and conserved in others. The VWD domain mRNA sequences (>6kb) for fifteen different orders of mammals, including 44 species, were obtained from GenBank and Ensembl, aligned, and then analyzed using both Bayesian and maximum likelihood methods to generate a phylogenetic tree. In most cases, relationships corresponded to phylogenies recovered from other datasets. For example, Primates, Artiodactyla, Perissodactyla, etc. each were recovered as monophyletic groups. However, some results were unusual, such as Afrosorocida grouping with Sirenia. Based on this study, baseline information suggests that variability among *ZAN* sequences in mammals is phylogenetically informative.

MICROBIOLOGY

55. ETP-LIKE TOXIN GENE EXPRESSION AND TOXIN DETECTION 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. The action by which *Bd* penetrates the skin and causes disease is unknown. We observed that the fungus is capable of killing nematodes without apparent attachment or completion of its life cycle. This suggests that a secreted substance capable of killing the host is produced by the fungus. Recent published work has also indicated a heat stable compound secreted by *Bd* that is capable in killing mammalian cells. The epipolythiodioxopiperazine (ETP) class of toxins increases the virulence of fungi. *Aspergillus* and *Gliocladium sp.* are fungal pathogens known to produce gliotoxin, an ETP toxin, through the production of 12 biosynthetic enzymes. We hypothesize that the presence and expression of core biosynthetic enzymes for gliotoxin in *Bd* indicates that this fungus could produce ETP-class toxins. Using the comparative search algorithm BLAST, we have observed the presence of all twelve required genes in *Bd* needed to produce ETP toxins. By using reverse transcriptase-PCR and Quantitative PCR we have studied the expression of seven of the twelve genes. High Pressure Liquid Chromatography-Mass Spectrometry is being used to validate the presence of the ETP toxin in *Bd*. These studies will contribute to our understanding of the mechanism(s) by which *Bd* is able to kill amphibians and can also aid in understanding other pathogenic fungi.

56. WHOLE GENOME SEQUENCING OF TWO WOUND ISOLATED *PSEUDOMONAS AERUGINOSA* STRAINS TO IDENTIFY GENETIC MECHANISMS OF ANTIBIOTIC RESISTANCE

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Chronic wounds present treatment challenges to clinicians due to the presence of polymicrobial biofilm communities. *Pseudomonas aeruginosa* is a dominant organism identified within these wounds, and multiple mechanisms of antibiotic resistance may contribute to *Pseudomonas*' ability to directly impact wound ecology and overall healing. The purpose of this study was to characterize two *P. aeruginosa* strains, PA0312 and PA1922, isolated from chronic wounds. Due to their origin, it was hypothesized that multiple genetic mechanisms of antibiotic resistance would be identified in both strains. Susceptibility profiles were performed to assess overall susceptibility, and whole genome sequencing using Roche 454 GS FLX was performed to identify the genetic content of PA0312 and PA1922. PA0312 and PA1922 were resistant to antibiotics categorized as fluoroquinolones and beta-lactams. Overall, genetic content between PA0312, PA1922, and reference strain PA01, was conserved. Focusing on protein encoding genes (PEGs), the prevalence and activity of predicted functions were different for both wound isolated strains. Strain specific PEGs were found (35 in PA0312 and 30 in PA1922); 18 of the aforementioned PEGs were sequenced in both PA0312 and PA1922. The majority of these strain specific PEGs identified from two *Pseudomonas* species (NCGM2.S1 and 39016); *P. NCGM2.S1* and *39016* were isolates with high resistance to antimicrobials. Using molecular sequencing and bioinformatics, we identified candidate protein encoding genes responsible for antibiotic resistant phenotypes. Future studies include quantifying expression levels of selected antibiotic resistance genes and strain specific PEGs. Moreover, patient demographics and co-morbidities will help elucidate inter-strain differences.

57. BIOFILM FORMATION BY THE FUNGAL PATHOGEN *BATRACHOCHYTRIUM DENDROBATIDIS* ENHANCES TEMPERATURE TOLERANCE

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The chytrid fungus *Batrachochytrium dendrobatidis* (*Bd*) has been implicated as a major contributor to the current global amphibian extinction crisis. The fungus infects keratinized epithelium of frogs and transitions from a flagellated zoospore into a chitin-walled reproductive zoosporangium. Death of susceptible animals results from impaired cutaneous function resulting electrolyte imbalances leading to cardiac arrest. The mechanisms by which the fungus persists in the environment, detects and infects the host are incompletely understood. A microbial biofilm is a biopolymer matrix-enclosed microbial

aggregate that can adhere to surfaces or exist at an air-liquid interface. Biofilms are an important mechanism by which microbes persist in the environment and can have a major impact on animal health because of their enhanced resistance to environmental stresses such as temperature, desiccation, and chemicals. Using a combination of differential interference contrast and scanning electron microscopy, biochemical assays and gene expression analysis, we show that *Bd* is capable of forming a biofilm. The fungus is metabolically active within the biofilm and shows temperature tolerance and viability up to 31°C ($p < 0.001$), 6°C above the high temperature tolerance observed for non-biofilm, planktonic cells (25°C). These observations allow us to postulate how *Bd* may survive at temperatures previously believed to be lethal to the chytrid fungus. They also provide an explanation of how *Bd* survives in the absence of its host. These observations have implications in how the fungus associates with and infects susceptible frogs and how the chytrid may be detected in the environment.

58. EFFECTS OF DAILY SOIL TEMPERATURE RANGE ON MICROBIAL COMMUNITY DYNAMICS IN A COTTON PRODUCTION SYSTEM: IMPLICATIONS FOR SUSTAINABILITY

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Temperature plays an important role in soil process; affecting microbial community composition and regulating the functions of microorganisms in decomposition and nutrient cycling. As a consequence of the climate change the Daily Temperature Range of soil (DTR_{soil}) is decreasing. The goals of this research are determine the level of microbial biomass carbon, carbon usage by bacteria and fungi, enzyme activity, characterization of microbial community under ambient soil temperature and reduce DTR_{soil}, and assess the change in soil temperature variability on cotton crop development and yield. Six plots were established in a cotton production system during the 2013 growing season using wood-fiber erosion control blankets to reduce (DTR_{soil}). Six control plots were established adjacent to the reduce DTR plots. Soil samples were collected before planting and over the growing season from each set of plots and analyzed to evaluate microbial biomass carbon, carbon usage, enzyme activity and characterization of microbial community. There was a reduction in the DTR_{soil} under the erosion blankets in comparison with the controls plots during the growing season. The reduction in DTR_{soil} lead to an increase in microbial biomass as the crop developed as compared to control plots. Cotton stand develop was poor in the control and was significantly higher in the reduced DTR plots. The cotton in the DTR plots went on produced a yield comparable to dry land under a good year. The reduction in DTR_{soil} will positively affect the dynamics of microbial communities and relationship with plants, which can lead to a well crop development.

NATURAL RESOURCES MANAGEMENT

59. PRONGHORN POPULATION DYNAMICS AND HABITAT CONNECTIVITY IN THE TEXAS PANHANDLE

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Pronghorn (*Antilocapra americana*) populations have the potential to fluctuate significantly due to environmental and anthropogenic influences. Habitat loss, in conjunction with varying forage availability, precipitation, and natural mortalities could explain some of the factors affecting pronghorn population variation. Pronghorn herd units in Texas are monitored every other year by the Texas Parks and Wildlife Department (TPWD) to determine the population size and distribution of pronghorn populations as well as to determine harvest recommendations. This study aims to evaluate the population-level effects of harvest and climate on population dynamics and to determine the quantity and connectivity of pronghorn habitat. To identify the impact of anthropogenic and climatic factors on pronghorn population growth and distribution in the Panhandle, this study will (1) utilize different population modeling methods to estimate pronghorn population dynamics using aerial survey, harvest, and precipitation data to inform the models, (2) generate a presence-only spatial model of suitable habitat for pronghorn in the Panhandle, and (3) determine the potential connectivity between suitable pronghorn habitat patches. The resulting population, habitat, and connectivity models can assist the TPWD and local managers in directing regional pronghorn conservation actions towards herd units with struggling, isolated populations and will offer management recommendations to mitigate the effect of man-made barriers to pronghorn movement.

60. SPATIAL VARIATION IN AQUATIC FOOD-WEB STRUCTURE IN AN ANTHROPOGENICALLY IMPACTED ARID-LAND RIVER

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Anthropogenic influences have been shown to disrupt natural longitudinal patterns in riverine food-web structure. The Pecos River is impacted by threats common in semi-arid regions including increased salinity, diminished discharge, altered flow regime, and conversion of watershed land for human uses. We used stable isotope analysis to characterize trophic positions of species and assemblage-wide resource use at twelve sites along the main stem of the Pecos River in New Mexico and Texas. Stable isotope ratios revealed different sources of carbon supporting fish production along the longitudinal fluvial gradient. Nitrogen isotopes elucidated variation in trophic position among species. For example, the coastal nonnative killifish, *Fundulus grandis* appears to feed at a higher trophic level than the native killifishes, *F. zebrinus* and *Lucania parva*. In addition, it appears that anthropogenic inputs are enriching baseline nitrogen isotopic ratios in part of the river. Furthermore, assemblage-wide trophic niche breadth was found to be greatest in less degraded sites with higher fish species richness. Characterizing changes in food-web structure in relation to natural and anthropogenic factors is important for habitat assessment, stream restoration, and management and conservation strategies.

61. SOME LIKE IT HOT: THE ROLE OF FIRE IN TEXAS HORNED LIZARD HABITAT MANAGEMENT

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Texas Horned Lizards (*Phrynosoma coronatum*) are state-listed threatened species experiencing population declines primarily due to Red Imported Fire Ants (*Solenopsis invicta*), pesticide use, and habitat degradation. Texas Horned Lizard habitat degradation in central Texas is due, at least in part, to fire suppression, which has created dense vegetation overstories in historically open habitat. We analyzed habitat structure and composition at two field sites in central Texas that use prescribed fire as a brush management tool. Camp Bowie, a site with very few lizards, has a taller, more dense canopy than Blue Mountain Peak Ranch, a site with much greater horned lizard abundance. Blue Mountain Peak Ranch also had more bare soil, grass, and forb cover. At both sites, recent fire use resulted in a shorter shrub canopy and a mosaic of habitats. However, more frequent fire at Blue Mountain Peak Ranch has contributed to sparse tree cover and increased habitat patchiness. These results suggest that brush management, specifically prescribed fire, may play an important role in managing habitat for Texas Horned Lizards.

62. SEASON-SPECIFIC LAND-USE BY BIRDS OF PREY IN THE SOUTHERN HIGH PLAINS: IMPLICATIONS FOR WIND ENERGY DEVELOPMENT

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Birds of prey are especially susceptible to collisions with wind turbines. Understanding season-specific associations of raptors across different land-uses can inform risk-based siting plans for wind energy development. From December 2012 – February 2014, we conducted monthly raptor surveys along a 1.6 km wide 154 km long route among 5 land-cover categories: textile agriculture, grain agriculture, grazed rangeland, ungrazed grassland, and other. We detected 1071 individual raptors of 15 species. Each species analyzed used the land categories disproportionately to their availability in most seasons. In general, ungrazed grasslands were used more than expected, grazed rangeland slightly more than expected, and textile agriculture far less than expected. Grain agriculture use appeared to be season-specific. However there were species-specific differences in cover-type use among seasons. For example, American Kestrels (*Falco sparverius*) used land-use categories in proportion to their availability in spring and fall, but not in winter and summer. Additionally, there were switches in cover-type use; kestrels used grasslands more than expected except in winter when they switched to harvested grain fields more than expected. Essentially, land types of greater raptor use can imply higher turbine-raptor collision risk. We will present results for five species for which we had sufficient samples for analyses.

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

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Assiminea pecos 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 ($n = 366$) and weathered wooden tiles left on the substrate ($n = 549$), for estimating *Assiminea pecos* distribution and relative abundance, and habitat use at two sites at Bitter Lake National Wildlife Refuge (BLNWR) in New Mexico. *Assiminea pecos* 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 *Assiminea pecos* 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 *Assiminea pecos* at BLNWR.

64. REPEATED STRIP SPAWNING OF SMALLEYE SHINER (*NOTROPIS BUCCULA*) AND SHARPNOSE SHINER (*NOTROPIS OXYRHYNCHUS*) FROM CAPTIVE BROOD STOCKS.

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As a result of natural (drought) and anthropogenic (dams, water mining) modifications to rivers in the Great Plains, broadcast spawning cyprinids are becoming increasingly imperiled. Because of this, captive propagation techniques have been proposed for many species as a means to help them persist during times in which natural reproduction is compromised or precluded. We conducted a series of spawning experiments with smalleye shiner *Notropis buccula* and sharpnose shiner *N. oxyrhynchus* to refine our previously described strip-spawning protocol. Twenty (20) female smalleye shiner and 19 female sharpnose shiner were injected with carp pituitary extract and strip spawned during ovulation. Mature ova from each female were collected and counted to determine fecundity. Females were then returned to a holding aquarium for two weeks, were fed, and allowed to recruit a new complement of ova. After two additional strip spawning trials (total = 3), survival rate for females was 55% for smalleye shiner and 42% for sharpnose shiner. Linear regression showed, between the three strip spawning events, the number of mature ova stripped from each female was significantly different between smalleye shiner ($P = 0.04$) and sharpnose shiner ($P = <0.001$). These results show that smalleye shiner and sharpnose shiner can successfully be spawned in captivity by stripping and that fish can be repeatedly spawned during a single reproductive season.

PLANT & SOIL SCIENCES

65. CELLULOSE: ABUNDANT BIOPOLYMER AND PRECURSOR FOR THE PREPARATION OF ADVANCED BIOMATERIALS

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As a major structural component of plants, cellulose is the most abundant biopolymer found in nature. Cellulose can be transformed into aerogel, a very porous, lightweight material with low thermal conductivity. One objective of this research was to compare the properties of cellulosic aerogels, or aerocelluloses, made with different concentrations of cellulose. A second objective was to determine if the aerocellulose could be functionalized to decontaminate water polluted by reactive dyes. Aerocellulose was made from Avicel[®] microcrystalline cellulose (MCC) that was swelled in a sodium hydroxide solution, regenerated in water and supercritically dried. Aerocelluloses of 5%, 9% and 11% MCC were prepared and characterized. Scanning electron microscopy was used to visualize surface morphology. Nitrogen gas adsorption isotherms were used to determine surface area and pore size and distribution. Fourier transform infrared spectroscopy was performed to examine differences in functional groups between MCC and aerocelluloses. Water absorption and thermal degradation were characterized by thermogravimetric analysis. Wide-angle X-ray diffraction was used to compare crystallinities. Aerocellulose

was functionalized by treatment with CR-2000, a cationic reagent. The cationized aerogel was placed in a solution of C.I. Reactive Blue 19, an anionic dye. Concentration of dye in the solution was measured over time using UV-Vis spectroscopy.

66. EXTRACTION AND CHARACTERIZATION OF GALACTOMANNAN FROM GUAR SEEDS

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Guar is a becoming a highly valuable crop for West Texas due to its drought tolerance and potential use in hydraulic fracturing in shale gas and oil harvesting. Characterization of guar gum (Galactomannan) using different analytical tools is essential to understand gum chemistry for optimal industrial applications. However, limited number of studies has been conducted to characterize the gum extracted from currently available guar germplasm. Therefore, galactomannan extracted from two leading guar cultivars in West Texas was characterized using different analytical tools to elucidate physical and chemical differences. Extraction of the gum is critical because impurities in the gum have great impact on the behavior of guar solutions. Gum was extracted with minimal contamination with continuous sample assessment using Fourier Transform Infrared Spectroscopy (FTIR) to determine the level of contamination. The gum was characterized by High Performance Liquid Chromatography (HPLC), Thermogravimetric Analysis (TGA), X-Ray Diffractometer (XRD), and FTIR to determine mannose and galactose contents, thermal stability, level of crystallinity and chemical composition. In addition, Scanning Electron Microscope (SEM) was used to visualize the morphology of guar seeds.

67. THE EFFECT OF CONSTITUTIVELY OVER-EXPRESSING THE GENE FOR TOMATO FRUCTOKINASE (*LeFRK1*) ON COTTON YIELD IN GREENHOUSE AND FIELD TRIALS.

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Cotton yield depends on cellulose synthesis during fiber wall development. Sucrose synthase (SuSy) cleaves sucrose to provide UDP-Glucose for cellulose synthesis. The other product, fructose, inhibits SuSy and can be removed by fructokinase (FRK). Fructokinases positively regulate cell wall development in tomato. Our hypothesis was that constitutively over-expressing the tomato gene (*LeFRK1*) in cotton would reduce SuSy inhibition and enhance cotton yield under optimum and, possibly, drought conditions. Three transgenic lines with moderate to high expression of *LeFRK1* in leaves and developing fibers, along with controls (segregating nulls) were subjected to well-watered and drought treatments under greenhouse and field conditions. The greenhouse-grown transgenic plants yielded 40-90% more seed cotton mass/boll and had higher boll numbers/plant than the nulls under all water regimes. However, no true correlation occurred between the fiber FRK activity and the increased yield/boll for the transgenic lines. Field-grown transgenic plants yielded 40-70% more seed-cotton mass/boll than the nulls under irrigated and water-deficit conditions. However, there was no genotypic difference in boll number/plant under water-deficit conditions in the field. Interestingly, transgenic plants receiving full irrigation in the field had higher rates of CO₂ assimilation, higher stomatal conductance, and higher rates of water loss from leaves than the nulls. We conclude that mechanisms in addition to the possible enhancement of cell wall synthesis in the fiber may be raising cotton yield in the transgenic plants. We hypothesize that potential *LeFRK1* over-expression during xylem development could improve water conduction to the leaves, thereby improving photosynthesis and cotton yield.

68. GROUND COVER FRACTION FROM GREEN AND RED CHANNELS OF A DIGITAL CAMERA

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Ground cover fraction is defined as the area of soil surface covered by plants when looking downwards, in percentage or fractional units. Ground cover fraction has been widely used, as it is related to crop growth and radiation capture. The most common method of ground cover fraction estimation using imagery is to separate plant pixels from soil pixels based on color values. Ground cover fraction involves separation of plant pixels from soil pixels either manually or using software. This procedure is time consuming and requires careful attention to separating plant pixels from non-plant pixels such as soil and rocks. Simple three-channel RGB cameras are inexpensive, accessible, user friendly, and can be used to estimate GCF. The

overall objective of this research is to compare two methods to estimate GCF and to determine whether GCF estimate are affected by irrigation or cotton cultivars using a digital camera.

69. SEASONAL CHANGES IN NITROGEN-USE STRATEGIES AND SOIL NITROGEN AVAILABILITY IN NATIVE AND INVASIVE WETLAND PLANTS

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Anthropogenic increases in soil nitrogen in freshwater wetlands favor invasive species, such as *Phalaris arundinacea*, compared to native sedges, such as *Carex stricta*. However, for these species, it is not known whether: (1) a relationship exists between leaf nitrogen content and soil nitrogen; (2) seasonal changes in leaf physiological processes relate to changes in soil nitrogen; (3) the nitrogen-use strategies differ between the native and invasive species. We hypothesized that the nitrogen-use strategy of *P.arundinacea* is to allocate nitrogen to photosynthesis, supporting high productivity while invading; while the strategy of *C.stricta* is to store nitrogen. At two sites in north-central Indiana in 2012, we collected data on total leaf nitrogen, photosynthesis, leaf-level soluble protein, and soil nitrogen over the growing season. In 2013, we determined leaf and soil nitrogen, leaf nitrate content, and soluble protein seasonally from twenty-one sites. *Phalaris arundinacea* maintained high leaf nitrogen, photosynthetic capacity, and soluble protein contents, whereas they decreased over the season for *C.stricta*. There was a general trend of increasing soil nitrate throughout the growing season, whereas soil ammonium decreased. We conclude that, throughout the growing season, *P.arundinacea* maintains high leaf nitrogen assimilation, allocating a high proportion of nitrogen to photosynthesis. Proportionately less nitrogen is allocated to photosynthesis by *C.stricta*, and its leaf nitrogen are unresponsive to the differences in soil nitrogen that we measured, appearing to be seasonally regulated. It is the allocation of nitrogen and the maintenance of the nitrogen pools over the growing season that differs between the two species.

70. DIGITAL IMAGE ANALYSIS OF OLD WORLD BLUESTEM CANOPY COVER AND LEAF AREA

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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 performances great with limited irrigation pasture where Ogallala aquifer levers are diminishing. The research aims to estimate leaf area index, percentage light interception from Digital Image Analysis (DIA), which potentially allows low-labor measurements of grass cover. The research indicated on the established pasture of B.Dahl at TTU New Deal research station. Samples are taken biweekly for 12 randomly selected plots during two growing periods: Period 1 is May 22 to July 16 and Period 2 is July 31 to October 16. Field sampling includes irradiance, which was measured above and below for calculating the light interception, overhead photos, which were taken and clipping biomass at 8 cm height for leaf area determination. Overhead photos were converted by ImageJ® software into two color groupings: green tissue and non-green cover. Research found that growth rate was greater in the first growing period; Light interception was linear related to ground cover from DIA with better R² value in the first period; leaf area index was curvilinear related to ground cover from DIA while stem and seed heads introduced high variation in the later part of the second period.

PROPOSAL

71. REPRODUCTIVE BEHAVIOR AND MATING SYSTEM OF SPOTTED SEATROUT *CYNOSCION NEBULOSUS*

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Spotted Seatrout *Cynoscion nebulosus* is an important estuarine-dependent finfish along the Texas Gulf coast. Even though the population is considered relatively stable in Texas, it has experienced dramatic population declines in the past and is vulnerable to habitat alteration and disturbance. Sound production is an important component of Spotted Seatrout reproductive behavior and could potentially serve as a useful metric in monitoring the size and reproductive output of Spotted Seatrout spawning aggregations. Our objective is to assess the relationship between sound production and egg production in two captive breeding populations of Spotted Seatrout. We used a hydrophone and video cameras to monitor Spotted Seatrout production tanks during the 2013 spawning season. Eggs were collected daily using a surface skimmer and counted. We will evaluate the quantity and quality of Spotted Seatrout calls in relation to egg production. Our study will provide more detailed

analysis of Spotted Seatrout acoustic behavior and potentially lead to non-invasive methods to evaluate reproductive output in the field.

72. SOIL MICROBIAL COMMUNITY RESISTANCE AND RESILIENCE TO PETRODIESEL VERSES 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 two soil types, a sandy 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.

73. USE OF A NOVEL NEST SUBSTRATE IN RESPONSE TO PREDATION RISK IN A NEOTROPICAL MIGRATORY BIRD, THE VEERY (*CATHARUS FUSCESCENS*)

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My dissertation focuses on habitat selection in a Neotropical migratory bird, the Veery (*Catharus fuscescens*). Here I concentrate on potential fitness tradeoffs between alternative nesting substrates, and consequences of human-induced environmental changes that may introduce novel nest substrates. In 2011, an unusually early, record-breaking snowstorm in the northeastern U.S. downed thousands of oak (*Quercus* spp.) limbs at my study site. These limbs (which retained leaves through the following summer) provided a novel nesting substrate, and most 2012 nest attempts were in fallen oak limbs (FOL). Further, Veery females appear cryptic nesting in FOL, in contrast with common alternative substrates. My primary question is: *Do Veery females select nest substrates that increase their crypticity, thereby increasing the survival on themselves and nests, particularly when they perceive predation risk to be high?* To explore this question, I will experimentally replicate this event by adding FOL to 20 study sites (with 20 unmanipulated plots). In addition, I will experimentally increase apparent visual-hunting predator abundance by broadcasting diurnal raptor calls at half of all plots to determine if Veeries shift to FOL in response to increased risk. This will allow me to explore underlying ecological drivers behind the dramatic shift of nesting habits in our study species caused by the unique but widespread phenomenon. Crypticity of incubating adults in nesting forest songbirds has been poorly studied. Additionally, few studies have attempted to experimentally replicate the results of such a weather event and test hypotheses that might explain consequent shifts in avian nesting behavior.

74. URBANIZATION OF PLAYA WETLANDS IN THE SOUTHERN HIGH PLAINS: PRESENT AND FUTURE PATTERNS UNDER FOUR GROWTH SCENARIOS

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Playas are shallow, temporary wetlands of the Southern High Plains (SHP) that are critical habitats for migratory and resident wildlife. Playas historically and presently are subject to numerous anthropogenic changes via urbanization. However, few studies have examined the potentially important conservation implications of urbanization on playa wetlands. Urban playas (colloquially “playa lakes”) are often highly modified with respect to hydrology, biotic composition, and surrounding landuse when compared to non-urbanized playas, and recent research has highlighted the distinction of urban playas with respect to differential aquatic contamination rates, unique hydroperiods, and their vital role in wetland network connectivity. Despite the importance of urban playas for wildlife, stormwater management, and recreation, limited knowledge exists of the current and expected rates of playa urbanization. Projected patterns of urbanization for the SHP (especially Lubbock and Amarillo, Texas) will incorporate portions of the surrounding exurban landscape along with an unknown number of playa wetlands. Conservation concerns for playa wetlands are magnified in light of shifting climate and demographics on the SHP. We

propose to develop a GIS-based model of projected rates of playa wetland incorporation under four distinct US EPA: Integrated Climate and Land Use Scenarios (ICLUS), with the goal to aid wildlife and municipal managers' planning and conservation of playa wetlands of the SHP.

75. OPTIMIZING PHOSPHATE UPTAKE OF FRESHWATER CYANOBACTERIA AND MICROALGAE: EVALUATING ABIOTIC CONTROLS

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Phosphorus, a vital nutrient mineral for the growth of living organisms, occurs in pentavalent forms in aquatic bodies. Of these forms, living cells can only utilize the orthophosphate form. An excess amount of phosphorus in water bodies is harmful to humans, livestock and aquatic animals. Despite the excess amounts of phosphorus present in marine and freshwater systems, there is a global shortage in supply of phosphorus as fertilizer due to its wastage. Recovery of this wasted phosphorus will not only alleviate environmental pollution, but also recycle the phosphorus back for use as fertilizer. Previous studies have shown that cyanobacteria and microalgae are good candidates for biological phosphorus uptake and removal from waste streams. Biomass produced during removal process can be used as fertilizer. The purpose of this project is to determine phosphate uptake rate of selected freshwater cyanobacteria and microalgae to determine ecological differences among a group of taxa. Once a continuum of outcomes has been determined, the project will analyze the effects of habitat factors, namely, pH, NaCl concentrations, temperature, nitrogen and phosphorus content on the growth and uptake rate in synthetic and Lubbock wastewater. Ion Chromatography and ICP-MS will be used to determine phosphate uptake rate and cellular phosphate content. Statistical analysis of treatments on phosphorous uptake will be performed using MANOVAs. Discriminate Function Analysis will evaluate the relationships of the abiotic factors on growth, internal phosphorous levels and uptake rates. Ultimately, this project aims to establish optimal conditions for phosphate uptake in selected freshwater cyanobacteria and microalgae.

76. RETURN OF THE PHANTOM ROAD: THE EFFECTS OF ROAD NOISE ON PASSERINE BREEDING ECOLOGY AND ON THE PERCEIVED PREDATION RISK OF A NEST PREDATOR, THE EASTERN CHIPMUNK (*TAMIAS STRIATUS*)

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Chronic anthropogenic noise, particularly from roads, has a nearly ubiquitous negative effect on many species, ranging from birds to mammals to amphibians. Yet, to date, only 1 study, termed the 'phantom road', has experimentally isolated road noise in an effort to observe effects on avian abundance. This previous work discovered that during fall migration road noise negatively affected both avian abundance and richness in a forested ecosystem. My proposed research will expand upon the previous study by observing effects of road noise on passerines during the breeding season and the effects on common nest predators. Using 3 focal species, the Ovenbird (*Seiurus aurocapillus*), Veery (*Catharus fuscescens*) and Wood Thrush (*Hylocichla mustelina*), I will focus on several aspects of the breeding ecology including: species abundance and richness, occupancy, breeding success and provisioning behavior. Conjointly, many low nesting passerines, including my focal species, tend to avoid areas with a high density of terrestrial predators. In an effort to better understand the effects of road noise on avian species, it is imperative to also assess the terrestrial predator community. This can be done by evaluating species abundance, and richness for avian and terrestrial predators via point counts. Moreover, giving-up-densities (GUDs) for Eastern Chipmunks (*Tamias straitus*), a terrestrial nest predator, will be used to assess the perceived predation risk of a terrestrial predator in association with road noise. My research offers new insight into terrestrial community structure, both avian and mammalian, and emphasizes the potential consequences of human encroachment on forested land.

TOXICOLOGY

77. DEVELOPMENT OF A PASSIVE SAMPLER TO MEASURE UPTAKE OF PERFLUORINATED COMPOUNDS

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Perfluorinated compounds (PFCs) used in aqueous firefighting foam, stain resistant and water repellent materials are emerging chemicals of concern. Although PFCs have been detected in the environment and in wildlife, there is a need for

sampling techniques that can accurately measure concentrations of PFCs over time and estimate the availability of PFCs to aquatic organisms. This work evaluates several designs of passive samplers for measuring the uptake of known concentrations of PFCs in a lab scenario. Preliminary data showed quantifiable concentrations of PFCs in a 9-mL vial containing milli-Q™ water (MQH₂O) and a polysulfone membrane. A regenerated cellulose dialysis membrane containing trioleate and placed in MQH₂O spiked with PFCs also resulted in quantifiable detections of PFCs within the membrane. Passive sampler tests involving Twister® stir bars, solid-phase micro-extraction fibers, and polyethersulfone membranes are underway. Following the lab study, the most effective passive sampler will be deployed to measure PFC concentrations over a one month interval in a bayou at the Barksdale Air Force Base in Bossier City, Louisiana. Monitoring data from our lab and others indicated that this bayou is contaminated with low levels of PFCs from runoff and groundwater infiltration from areas where aqueous firefighting foam was used for fire training on the base. The field test will demonstrate how passive sampling can be used to evaluate the potential exposure of aquatic organisms to PFCs in the bayou, and will contribute to a larger study in our laboratory of the environmental fate and impacts of PFCs in aquatic environments.

78. POPULATION EFFECTS OF SUB-LETHAL MALATHION EXPOSURE TO LARVAE OF THE YELLOW-FEVER MOSQUITO, *Aedes aegypti*; INFLUENCE OF CHEMICAL CONCENTRATION, TEMPERATURE, AND AGE AT EXPOSURE

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Sub-lethal toxicant exposures to developing organisms can have far reaching effects on life history traits such as developmental timing, mortality, and ultimately fecundity. In turn, these types of latent effects can translate to changes in population structure and dynamics. In the case of the Yellow-fever mosquito *Aedes aegypti* (Family Order: Diptera; Family: Culicidae), previous research has shown that the effects of sub-lethal exposure to malathion can depend upon both chemical concentration and temperature, with females exposed to concentrations at higher temperatures being larger and potentially more fecund. However, we found that age of exposure can also potentially influence chemical affects, with first instars (LC₅₀≈0.072 mg/l) showing greater sensitivity than 4th instars (LC₅₀≈0.095 mg/l). We conducted experiments which investigated how both concentration, temperature and time of larval exposure (1st or 4th instar) influences stage-specific vital rates. Results of the experiments showed that age at exposure can influence the combined effects of temperature and malathion concentration on larval survival, with a potentially significant interaction found for larva exposed as 1st instars, but not for larvae exposed as 4th instar. We then investigated how these impacts affect population structure over time by incorporating measured vital rates into a partial life-cycle population model. Preliminary modeling results suggest that temperature, exposure concentration, and larval population age structure at time of exposure may have significant population-level affects. This research demonstrates that exposures to stressors during development can have far-reaching impacts that can manifest later in life and in higher levels of biological organization.

79. DETECTION OF PERFLUORINATED COMPOUNDS IN BIOTA NEAR BARKSDALE AIR FORCE BASE, LOUISIANA

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Perfluorinated compounds (PFCs) have received a high volume of research attention due to their recent classification as emerging contaminants of concern by the U.S. Environmental Protection Agency. PFCs are long-chained carbon compounds saturated with fluorine and containing a hydrophilic head group, giving them unique properties that made them excellent grease and stain resistors and components in Aqueous Film Forming Foams (AFFFs). However, the presence of both the lipophilic backbone and hydrophilic head group also facilitates their ability to bioaccumulate in protein-rich regions like the liver, brain, and in serum. PFCs are ubiquitous in the environment and accumulation in biota around the globe has been documented (Houde et al., 2011). Our study site of Barksdale Air Force Base in Bossier City, Louisiana, historically conducted fire-fighting training on site with AFFFs containing PFCs like perfluorooctane sulfonate (PFOS). This study focused on six emerging PFCs in aquatic organisms sampled opportunistically in August 2013. Fish and invertebrates were collected from six locations on site, for a total of 57 composites representing 16 different species. There was a significant difference in PFOS concentrations by location, indicating the continued presence of PFCs in this formerly exposed region. Perfluorohexane sulfonate (PFHxS) was the only other PFC consistently detected in biota, but it did not vary significantly by location or species. Accumulation of PFCs in biota has implications for human health due to the potential transfer of PFCs to humans through diet. This study is part of a larger ecological risk assessment at Barksdale AFB.

80. DEVELOPING A MULTI-COMPARTMENT PERFLUOROOCCTANE SULFONATE (PFOS) UPTAKE AND DEPURATION MODEL FOR FISH

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Perfluorooctane sulfonate (PFOS) is a persistent perfluoroalkylated acid that has been found to accumulate and biomagnify throughout food webs. Aquatic organisms are of particular interest with regard to the ecotoxicology and fate of PFOS because these organisms have two potential pathways for PFOS exposure – via diet and water. Fish are especially important in aquatic systems because many represent higher trophic levels within the aquatic food web and serve as a potential exposure pathway to humans. This project presents results from a preliminary three-compartment bioaccumulation model using a kinetic bioaccumulation factor for uptake and depuration over time of PFOS in fish. The uptake and depuration kinetics data used in the model were obtained from peer-reviewed sources as well as studies we have recently conducted. The ultimate objective is to develop a refined fish bioaccumulation model that can be used with field measurements of PFOS concentrations in dietary items and water to predict PFOS concentration in fish. The current model predicts a hyperbolic accumulation of PFOS over time that matches patterns observed in uptake studies. According to the model, PFOS tissue concentrations approach an asymptote after approximately 12 days, at a concentration 10,000 times greater than aqueous exposure levels, assuming constant PFOS exposure. The model indicates that accumulation in the blood and liver is approximately 5 times greater than accumulation in the carcass. The model also suggests that exposure to contaminated water is of greater importance to accumulation than from contaminated diet. The model predictions are consistent with data in the literature.

81. CARBON NANOTUBE UPTAKE, TRANSLOCATION, AND STRESS EFFECTS IN DROUGHT INDUCED CORN (ZEA MAYS L.) GROWN IN SOIL

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In recent years, nanomaterial production and applications have increased. Carbon nanotubes (CNTs) are used in industries such as water treatment, environmental remediation, and agriculture, some processes involving direct application to the terrestrial environment, where the possibility of plant uptake and human dietary exposure is increased. This study describes the uptake, translocation, and stress effects that CNTs have on corn plants during ideal and simulated drought conditions. All CNTs were characterized through thermo-gravimetric analysis prior to the study. Corn was grown in soil spiked with 0, 10, 100, and 1000 mg/kg concentrations of multi-walled nanotubes (MWNTs) and at separately spiked concentrations of 0, 10, 100 mg/kg of unmodified, surfactant stabilized and covalently modified single-walled nanotubes (SWNTs) for 40 day periods under ideal conditions. Root uptake concentrations for CNTs were <25 µg/g. CNTs were translocated to upper plant parts but at smaller concentrations of ≤ 6 µg/g. Additionally, a study was done with corn grown in soil spiked separately with 10 mg/kg concentrations of unmodified and covalently modified SWNTs for a 50 days with 7 day simulated drought periods. The photosynthetic rate of plants was measured periodically during all drought periods. Study analysis is ongoing. After each experiment, roots, stems, and leaves were separated, dried, grounded, and analyzed using a heat-assisted microwave technique to measure CNT concentrations. Further studies implementing CNT transfer and effects in plants is important for human and environmental risk assessment.

82. AN ASSESSMENT OF POTENTIAL STRESSORS TO DUNES SAGEBRUSH LIZARD (SCELOPORUS ARENICOLUS) HABITAT IN WESTERN TEXAS AND AN ANALYSIS OF THE ENDANGERED SPECIES ACT (ESA) CLASSIFICATION PROCESS.

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The U.S. Fish & Wildlife Service (FWS) recently considered listing *Sceloporus arenicolus* or the Dunes Sagebrush Lizard (DSL) as “endangered” under the Endangered Species Act (ESA). The FWS proposed the listing largely based on the assumption that oil and gas production in the area resulted in a reduction of the DSL population. Proposed stressors included direct habitat loss due to road/well pad construction and the historical use of tebuthiuron. In addition to habitat modification,

the FWS also identified potential indirect effects from exposure to chemical releases from oil and gas activity. This study analyzed delineated dunes in Andrews County for the presence of chemical stressors, the amount of habitat modification, and potential for impact on DSL habitat and populations. Overall, we found very low concentrations, if any, of H₂S, tebuthiuron, and TPH within dune areas. Additionally, we analyzed sand samples from DSL habitat for sulfate (SO₄⁻²) concentrations, pH, and sand particle size. Although sulfate concentrations and pH from the study sites varied slightly from local sand samples collected outside of Andrews County, variance was minimal. Sand particle size was also fairly consistent between study sites, regardless of the amount of oil and gas development. Finally, we created a method, using Arc-GIS and aerial imagery from 1996-2012 to quantify habitat modification within delineated dunes on UT Lands in Andrews County. We noted a marked increase in road/well pad construction from 2004-2012 throughout most of these areas. We concluded that habitat modification remains the primary threat to DSL populations.

POSTER (GRADUATE)

83. ECOLOGY AND NATURAL HISTORY OF THE SIBERIAN CHIPMUNK, *TAMIAS SIBIRICUS*, IN KOREA

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Compared to European countries where the Siberian chipmunk (*Tamias sibiricus*) is an invasive species, there is a paucity of information on the ecology and natural history of Korean populations. *Tamias sibiricus* is native species with large populations in Korea. We conducted field research during January to December 2012 in a forest habitat located in Hongcheon-gun, Gangwon-do (centered at 37°45' 50''N., 127°50'52''E.) in central Korea. We used both radio tracking and capture-recapture techniques to identify the home range and nesting habitat of this chipmunk. We also excavated and measured burrows and analyzed food items from caches in burrows. The mean home range size for males was 14,129 m² and 4512 m² for females. Burrow systems typically had a nest, latrine, and food caches with tunnels. Tree nests were uncommon and co-nesting for summer sleeping and winter torpor was also rare. The percent of primary food items from caches were chestnut (77.0%), Mongolian oak acorn (12.1%), and bird's-foot trefoil (2.1%). The information reported on the ecology and natural history of the Siberian chipmunks in Korea in this research will contribute the future research and management for this species.

84. THE ROLE OF EVOLUTION FOR THE INVASION OF SALT CEDAR (*TAMARIX RAMOSISSIMA*) ACROSS TEXAS

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Invasive species provide opportunities to study evolution in action, yet the role of evolution during biological invasion has been understudied. Because colonizers face environmental challenges during colonization, selection might favor increased physiological tolerance to environmental demands. Genetic variation in a trait is required for a response to selection, but its presence does not prove that there has been adaptation. Genetic variation can be measured using common garden studies, and past adaptation can be inferred or assessed in several ways including reciprocal transplant studies, detection of correlations between the environment and genetic variants, and comparisons between quantitative trait divergence (Q_{st}) and divergence of neutral genes (F_{st}). Since it escaped from cultivation in the late 1800's, salt cedar (*Tamarix ramosissima*) has become major threat to riparian ecosystems in the western U.S. Understanding the role of adaptation during its spread will provide insight into both the evolutionary process and management strategies for its control. The primary goals of my research are to: 1) assess whether *T. ramosissima* populations harbor genetic variation for traits related to drought tolerance, 2) determine whether drought tolerant phenotypes are correlated with annual precipitation at the sites origin, and 3) assess whether *T. ramosissima* harbors signatures of variation that are consistent with past adaptation in drought tolerance.

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