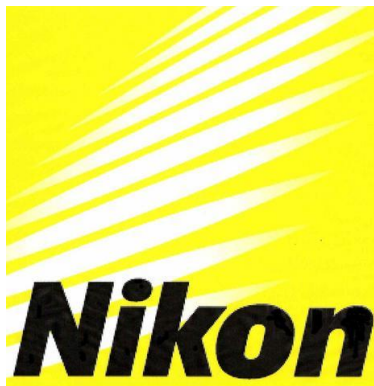


## SPECIAL THANKS TO OUR EVENT SPONSORS



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## ACKNOWLEDGEMENTS

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

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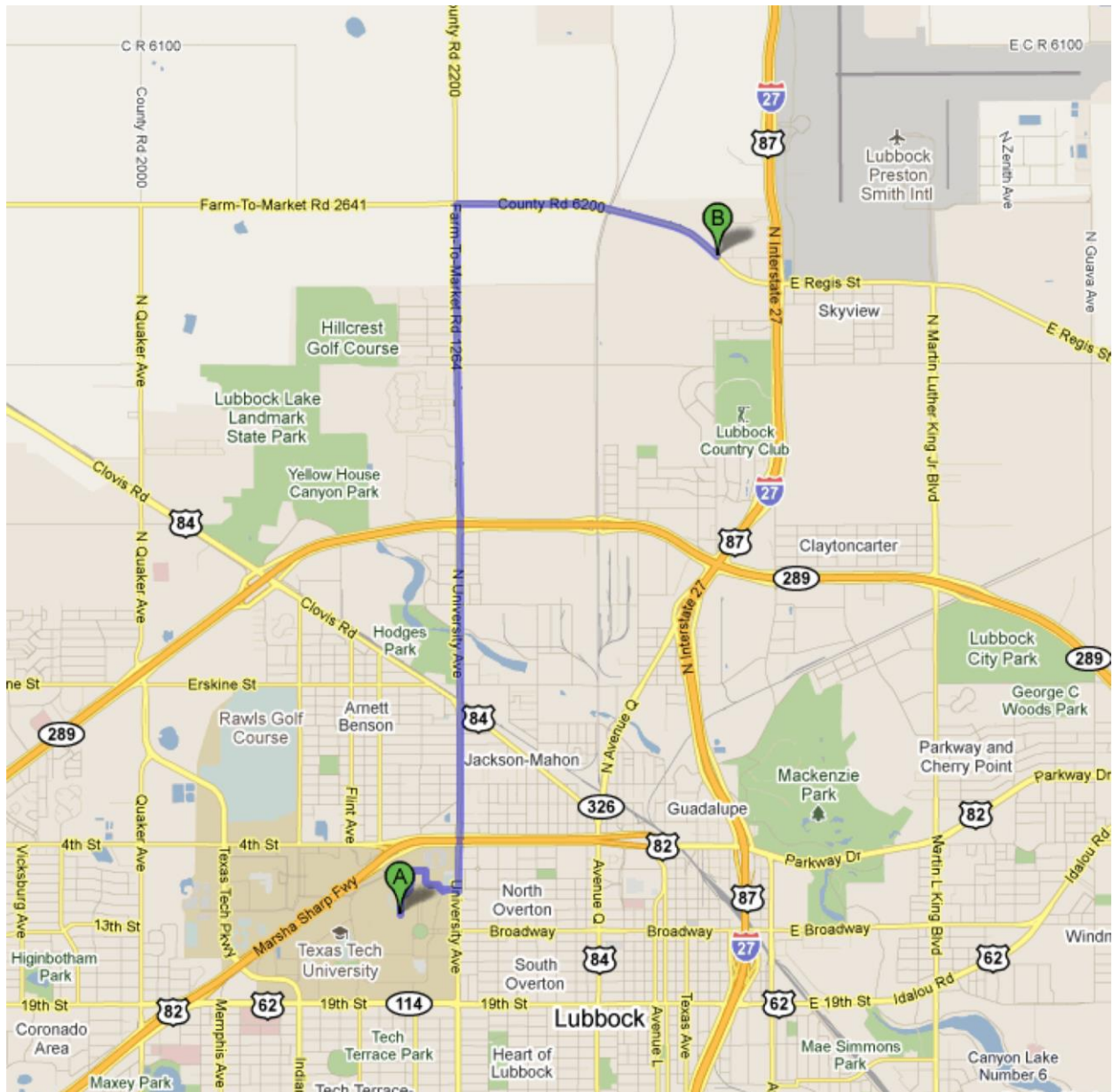
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# MAP OF UNITED SPIRIT ARENA



## FROM EXPERIMENTAL SCIENCES BUILDING PARKING LOT

1. Head north on Canton Ave toward 7th St – go 0.3 mi
2. Turn right at Drive of Champions – go 0.1 mi
3. Drive of Champions turns right and becomes Akron Ave/Boston Ave/Red Raider Ave (Continue to follow Akron Ave) – go 0.2 mi
4. Turn left at Glenna Goodacre Blvd – go 0.1 mi
5. Turn left at University Ave – go 4.3 mi
6. Turn right at County Rd 6200/Farm-To-Market Rd 2641 E – go 1.7 mi



# TEXAS TECH UNIVERSITY CAMPUS MAP & PARKING



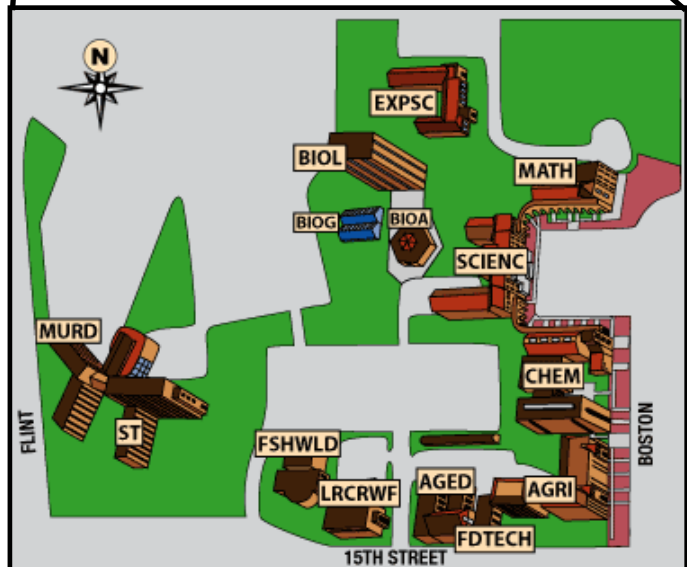
- 2** Biological Sciences Building
- 20** Experimental Sciences Building

## **BIOL – Biological Sciences Building**

Enter 15th St. via Flint Ave. Visitor parking will be available for off-campus registrants through the kiosk on April 1st. Lot will be open April 2nd.

## **EXSPC – Experimental Sciences Building**

Enter Canton Ave. via Drive of Champions. Visitor parking will be available for off-campus registrants through the kiosk on April 1st. Lot will be open April 2nd.



# LOCAL RESTAURANTS

## ON CAMPUS

<b>Name</b>	<b>Address</b>	<b>Phone</b>
The Market	Stangel-Murdough Hall	N/A
Student Union Food Court	Student Union Building	N/A
Sam's Place	Murray Hall	N/A

## WALKING DISTANCE (EAST OF CAMPUS)

<b>Name</b>	<b>Address</b>	<b>Phone</b>
Bar PM	1211 University Avenue	(806) 747-2720
Chili's Grill & Bar	607 University Avenue	(806) 744-2025
Chimy's Cervceria	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

## SHORT DRIVING DISTANCE (INSIDE LOOP 289)

<b>Name</b>	<b>Address</b>	<b>Phone</b>
Arby's	2422 19th Street, Suite 6037	(806) 744-2535
Burger King	2405 19th Street	(806) 762-2282
Café J	2605 19th Street	(806) 741-5400
Fuzzy's Taco Shop	2102 Broadway	(806) 740-8226
Gardski's Loft	2009 Broadway	(806) 744-2391
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
Schlotzsky's Deli	3719 19th Street	(806) 793-5542
Skooner's Grill & Bar	1617 University Avenue	(806) 749-7625
Wendy's	2401 19th Street	(806) 741-0955

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## Awards Banquet

?

## Oral Presentations

?

## Breaks

?

## Plenary Speaker/Program

?

## IT/Website

?

## Poster Competition

?

## Opening Social/Vendor Show

?

## Registration

?

## Vendor Show

?

**TEXAS TECH ANNUAL BIOLOGICAL SCIENCES SYMPOSIUM**  
**3RD ANNUAL MEETING**  
**30-31 MARCH 2012**  
**TEXAS TECH UNIVERSITY–LUBBOCK**

**PROGRAM-AT-A-GLANCE**

**FRIDAY, 30 MARCH**

- 5:00 pm – 8:00 pm**      **Registration – United Spirit Arena, City Bank Conference Room**
- 5:00 pm – 8:00 pm**      **Opening Social & Vendor Show – United Spirit Arena, City Bank Conference Room**
- 6:00 pm – 7:00 pm**      **Poster Session – United Spirit Arena, City Bank Conference Room (Poster Hanging 4:30 – 5:00 pm)**

**SATURDAY, 31 MARCH**

- 8:00 am – 11:30 am**      **Registration – BIOL Lobby**
- 8:00 am – 8:25 am**      **Continental Breakfast – BIOL Lobby**
- 8:25 am – 8:45 am**      **Welcome – BIOL 101**
- 8:45 am – 9:45 am**      **Oral Presentations – BIOL 101, BIOL 106, ESB 120**
- 9:45 am – 10:15 am**      **Break – BIOL Lobby**
- 10:15 am – 11:30 am**      **Oral Presentations – BIOL 101, BIOL 106, ESB 120**
- 11:30 am – 1:00 pm**      **Lunch – On Your Own**
- 1:00 pm – 2:15 pm**      **Oral Presentations – BIOL 101, BIOL 106, ESB 120**
- 2:15 pm – 2:45 pm**      **Break – BIOL Lobby**
- 2:45 pm – 3:45 pm**      **Oral Presentations – BIOL 101, BIOL 106, ESB 120**
- 3:45 pm – 4:00 pm**      **Break – BIOL Lobby**
- 4:00 pm – 5:00 pm**      **Plenary Presentation (Dr. Celia López-Gonzalez) – BIOL 101**
- 5:00 pm – 6:00 pm**      **Collections & Exhibit Viewing – International Cultural Center (see previous map)**
- 6:00pm – 9:00pm**      **Awards Banquet – International Cultural Center**

## DETAILED SCHEDULE OF EVENTS

<b>FRIDAY PM 5:00 – 8:00</b>	<b>REGISTRATION</b> United Spirit Arena, City Bank Conference Room
<b>5:00 – 8:00</b>	<b>OPENING SOCIAL &amp; VENDOR SHOW</b> United Spirit Arena, City Bank Conference Room
<b>6:00 – 7:00</b>	<b>POSTER SESSION</b> United Spirit Arena, City Bank Conference Room
	1 – POPULATION GENETICS OF THE AMERICAN CROCODILE IN COIBA MARINE NATIONAL PARK, PANAMA. <u>Ashish Bashyal</u> , Miryam V. Anaya, and Llewellyn D. Densmore
	2 – PARTIAL PURIFICATION AND CHARACTERIZATION OF 4T1 MURINE BREAST CANCER CELL CYTOTOXINS FROM <i>CURCUMA LONGA</i> . <u>Trevor A. Burrow</u> , Libby M. Saultz, Jenna L. Wilson, Stephanie D. Whitaker, Jarrett H. Ross, Adam J. Reinhart, and Gary O. Gray
	3 – EFFECT OF LATITUDE IN BAT ASSEMBLAGES FROM WESTERN ECUADOR. <u>Juan P. Carrera-E.</u> , Noe de la Sancha, Nicté Ordoñez-Garza, Sergio Solari, Carl J. Phillips, and Robert J. Baker
	4 – THE EFFECTS OF TRICLOSAN ON ATLANTIC CROAKER'S ANTI-PREDATOR STRATEGIES. <u>Apollo Castillo</u> , Tiffany Hopper, and Sandra Diamond
	5 – BAT SPECIMENS FROM TEXAS DEPARTMENT OF STATE HEALTH SERVICES ARE A VALUABLE RESOURCE FOR REFINING (OR DOCUMENTING) SPECIES DISTRIBUTION. <u>Krysta D. Demere</u> and Loren K. Ammerman
	6 – CHARACTERIZATION OF <i>HAT</i> AND <i>PIGGYBAC</i> TRANSPOSABLE ELEMENTS IN MOUSE EARED BATS (GENUS: <i>MYOTIS</i> ). <u>Candace A. Frerich</u> and Loren K. Ammerman
	7 – FIRE SURVIVAL STRATEGIES OF OAKS IN THE TRANS-PECOS MOUNTAINS. <u>Maria S. Gaetani</u> and Dylan W. Schwilk
	8 – UTILIZING A VIRAL GENE TOWARDS GENERATING INSECT-RESISTANT <i>ARABIDOPSIS</i> AND COTTON. <u>Saranya Ganapathy</u> , Guoxin Shen, Hong Zhang, and Shan L. Bilimoria
	9 – THE PRESENCE OF EPIPOLYTHIODIOXOPIPERAZINE (ETP) TOXIN IN <i>BATRACHOCHYTRIUM DENDROBATIDIS</i> . <u>Amanda M. Hicks</u> and Michael J. San Francisco
	10 – ACUTE RADIATION TOLERANCE FOLLOWING <i>IN UTERO</i> LOW-DOSE IRRADIATION. <u>Eric K. Howell</u> , Sergey P. Gaschak, Kenneth D. W. Griffith, and Brenda E. Rodgers



11 – METHOD FOR ESTIMATING RAPTOR FLIGHT HEIGHT TO CALCULATE COLLISION RISK PRIOR TO THE DEVELOPMENT OF A WIND ENERGY FACILITY. <u>Erik W. Jansen</u> , Clint B. Boal, and Laura R. Nagy
12 – TORRENT MINNOW TAXONOMY TIDY UP: SYNONYMIZATION OF <i>PSILORHYNCHUS GRACILIS</i> RAINBOTH 1983 WITH <i>PSILRHYNCHUS NUDITHORACICUS</i> TILAK & HUSAIN 1980. <u>Laci E. Jazisek</u> , Drew E. Dittmer, and Kevin W. Conway
13 – CTR9 IS A CELL CYCLE AND CELL SIZE REGULATOR IN YEAST ( <i>SACCHAROMYCES CEREVISIAE</i> ) WITH IMPLICATIONS IN ONCOGENESIS. <u>Thivakorn Kasemsri</u> , Anthony McDowell, Huzefa Dungrawala, Lesley Abraham, Hui Hua, Jill Wright, Jessica Stilwell, and Brandt Schneider
14 – CHEMOTHERAPEUTIC SENSITIZATION OF LEPTOMYCIN B RESISTANT LUNG CANCER CELLS BY PRETREATMENT WITH DOXORUBICIN. <u>Chuanwen Lu</u> , Changxia Shao, Everardo Cobos, Kamaleswar P Singh, Weimin Gao
15 – ASSESSMENT OF HANTAVIRUS AND ARENAVIRUS ANTIBODY PREVALENCE AND ASSOCIATED RODENT SPECIES IN DICKENS COUNTY, TEXAS. <u>Matthew R. Mauldin</u> , Megan S. Corley, Mary Louise Milazzo, and J. Delton Hanson
16 – ROLAND SPRINGS RANCH LOCALITY 1, AN EARLY PLEISTOCENE FAUNA FROM THE SOUTHERN PLAINS OF TEXAS. <u>John Moretti</u> and Eileen Johnson
17 – THE UTILITY OF ZONADHESIN IN EXAMINING A POTENTIAL ISOLATING MECHANISM IN THREE PAIRS OF RODENT SPECIES. <u>Emma K. Roberts</u> , Daniel M. Hardy, and Robert D. Bradley
18 – THE WHITE RABBIT: MATURING COTTON FIBER ON TIME. <u>Nicholas E. Sanford</u> and Thea A. Wilkins
19 – CYTOTOXIC AND APOPTOTIC EFFECTS OF <i>ZINGIBER OFFICINALEA</i> (GINGER ROOT), <i>CURCUMA LONGA</i> (TURMERIC), <i>SANGUINARIA CANADENSIS</i> (BLOOD ROOT) AND <i>WITHANIA SOMNIFERA</i> (ASHWAGANDHA) IN 4T1 MURINE AND MCF-7 HUMAN BREAST CANCER CELL LINES. <u>Libby M. Saultz</u> , Jarrett H. Ross, Trevor A. Burrow, Jenna L. Wilson, Stephanie D. Whitaker, Gary O. Gray, and Adam J. Reinhart
20 – A PRELIMINARY RESTRICTION MAP OF THE A-S FRAGMENT FROM <i>BRASSICA RAPA</i> CV RAPID CYCLING. <u>Jamie Seabourn</u> and Paul Mangum
21 – MICROBIAL AND NUTRIENT DYNAMICS IN RESPONSE TO TEMPERATURE IN THE CHIHUAHUAN DESERT. <u>Natasja C. van Gestel</u> , John C. Zak, and David T. Tissue
22 – VITAMIN E PROTECTS BENZO(A)PYRENE -INDUCED CYTOTOXICITY THROUGH INHIBITION OF PHOSPHORYLATION OF P53 AND P21. <u>Wenbin Zhu</u> and Weimin Gao
23 (Not Competing) – INDIVIDUAL COTTON FIBERS TENSILE PROPERTIES: WITHIN-SAMPLE INVESTIGATION. <u>Farzad Hosseinali</u> , Eric Hequet, and Nouredine Abidi
24 (Not Competing) – EVALUATION OF VARIOUS MEASUREMENTS FOR ASSESSING MATURITY OF COTTON FIBERS. <u>Dev R. Paudel</u> , Eric F. Hequet, Nouredine Abidi, Brendan Kelly, Roji Manandhar, and Farzad Hosseinalli

<b>SATURDAY AM</b> <b>8:00 – 11:30</b>	<b>REGISTRATION</b> Biology Lobby		
<b>8:00 – 8:25</b>	<b>CONTINENTAL BREAKFAST</b> Biology Lobby		
<b>8:25 – 8:45</b>	<b>WELCOME</b> Biology 101		
	<b>I. ECOLOGY</b> Biology 101	<b>II. CELL &amp; MOLECULAR BIOLOGY</b> Biology 106	<b>III. PROPOSAL</b> Experimental Sciences 120
<b>8:45</b>	25 – HABITAT ASSOCIATIONS AND ABUNDANCE ESTIMATES OF NATIVE AND EXOTIC FRESHWATER SNAILS IN A WEST TEXAS SPRING <u>Jeff L. Bradstreet</u> and David L. Rogowski		32 – DEVELOPING A MONITORING PLAN FOR BATS OF THE GREAT PLAINS OF TEXAS <u>Marina L. Fisher-Phelps</u> and Tigga Kingston
<b>9:00</b>	26 – DISCHARGE CONTROLS THE DISTRIBUTION OF RIVERINE DRAGONFLIES IN MAINE <u>Steven D. Collins</u>	29 – EXAMINATION OF TRANSGENE SILENCING USING DICER LIKE KNOCKDOWNS IN <i>NICOTIANA TABACUM</i> <u>Nancy Layland</u> and Jeff Velten	33 – OAK WATER USE STRATEGIES IN THE SKY ISLANDS OF THE SOUTHWESTERN UNITED STATES <u>Russell D. Lackey</u> and Dylan W. Schwilk
<b>9:15</b>	27 – THE SONG OF THE FROG: SOUTHERN HIGH PLAINS AMPHIBIAN COMMUNITY ECOLOGY DURING A DROUGHT <u>Jessica A. Kissner</u> and Kerry L. Griffis-Kyle	30 – NEK2-TARGETED ASO OR siRNA PRETREATMENT ENHANCES ANTI-CANCER DRUG SENSITIVITY IN TRIPLE NEGATIVE BREAST CANCER CELLS <u>Jaehyung Lee</u> and Lauren Gollahon	34 – EXAMINATION OF POLYCYCLIC AROMATIC HYDROCARBONS IN AN URBAN STORMWATER SYSTEM AND THEIR TERATOGENIC EFFECTS ON ODONATA <u>Lucas J. Heintzman</u> and Nancy E. McIntyre
<b>9:30</b>	28 – SOME LIKE IT HOT, BUT NOT OVENBIRDS ( <i>SEIURUS AUROCAPILLA</i> ): HOW ENVIRONMENTAL FACTORS INFLUENCES NEST SUCCESS IN A FOREST SONGBIRD <u>Janice K. Kelly</u> and Kenneth A. Schmidt	31 – ILLUMINATING THE FUNCTIONAL ROLE OF “NTAD” PROTEINS IN ADDICTION AND RELAPSE <u>Kenneth D.W. Griffith</u> , Boyd Butler, and Brenda E. Rodgers	35 – SWARMING AND MATING BEHAVIOR OF FROG - BITING MIDGES (DIPTERA: CORETHRELLIDAE) <u>Priyanka de Silva</u> and Ximena E. Bernal
<b>9:45 – 10:15</b>	<b>BREAK</b> Biology Lobby		

SATURDAY AM	IV. UNDERGRADUATE/NATURAL RESOURCES MANAGEMENT Biology 101	V. MICROBIOLOGY Biology 106	VI. TOXICOLOGY Experimental Sciences 120
10:15	36 – INCREASING THE FINE SCALE RESOLUTION OF DETECTING AMERICA AND MORELET’S CROCODILE INTROGRESSIVE HYBRIDIZATION USING A LARGE NUMBER ON MIRCOSATELLITES <u>Brandon A. Gross</u> , Miryam V. Anaya, Jeremy P. Weaver, and Llewellyn D. Densmore III	41 – Vfr DIRECTLY REGULATES THE EXPRESSION OF THE <i>P.AERUGINOSA</i> OPERON PA2782-PA2783 <u>Aysegul Balyimez</u> , Michael San Francisco, and Abdul Hamood	46 – ENVIRONMENTAL FATE OF TEBUTHIURON: DATA GAPS RELATED TO ITS USE FOR BRUSH MANAGEMENT IN DUNES SAGEBRUSH LIZARD AND LESSER PRAIRIE CHICKEN HABITAT <u>Anu O. Anele</u> and Todd A. Anderson
10:30	37 – EFFECTIVENESS OF SCENT STATIONS, GAME CAMERAS, AND SCENT TYPES FOR ASSESSING MAMMALIAN PRESENCE AND ABUNDANCE IN AN URBAN ENVIRONMENT <u>Corin M. Olivas</u> and Andrew C. Kasner	42 – SOIL MICROBIAL COMMUNITY FUNCTION AND REDUCED DAILY TEMPERATURE RANGE: IS THERE ANY LINK? <u>Nirmala Dhungana</u> and John C. Zak	47 – MINIMALLY INVASIVE TECHNIQUE FOR DETERMINATION OF METALS PRESENT IN TISSUES OF THE GREEN SEA TURTLE <i>CHELONIA MYDAS</i> <u>Derek R. Faust</u> , Michael J. Hooper, George P. Cobb, Melanie Barnes, Donna Shaver, Shauna Ertolacci, and Philip N. Smith
10:45	38 – EXPLORATORY BEHAVIOR AND FORAGING SUCCESS IN A NOVEL ENVIRONMENT: THE CURIOUS CASE OF THE CANE TOAD ( <i>RHINELLA MARINA</i> ) <u>Amanda J. Arner</u> , Rachel A. Page, and Ximena E. Bernal	43 – TENABLE COSTS OF BAYOU VIRUS INFECTION IN <i>ORYZOMYS PALUSTRIS</i> (MARSH RICE RAT) <u>Tyla S. Holsomback</u> , Alisa A. Abuzeineh, Nancy E. McIntyre, and Jorgé Salazar-Bravo	48 – CO-EXPOSURE TO XENOESTROGENS AND BENZO(A)PYRENE ALTERS DNA DAMAGE RESPONSE <u>Kaylyn E. Germ</u> and Greg D. Mayer
11:00	39 – EFFECTS OF HABITAT ISOLATION ON SPECIES TURNOVER AND COMMUNITY NESTEDNESS IN A DESERT RIVER SYSTEM <u>Seiji Miyazono</u> and Christopher M. Taylor	44 – REGULATION OF <i>LEISHMANIA</i> SPHINGOLIPID METABOLISM VIA SPHINGOSINE KINASE Ou Zhang, <u>Mattie C. Pawlowic</u> , and Kai Zhang	49 – SUBLETHAL EFFECTS OF TRICLOSAN ON ATLANTIC CROAKER ( <i>MICROPOGONIAS UNDLUATUS</i> ) <u>Tiffany L. Hopper</u> and Sandra Diamond
11:15	40 – SIZE MATTERS: USING ALLOMETRY TO CONTROL INVASIVE AUSTRALIAN CANE TOADS ( <i>BUFO MARINUS</i> ) <u>Lynne E. Beaty</u> and Christopher J. Salice	45 – ANALYSIS OF <i>BATRACHOCHYTRIUM DENDROBATIDIS</i> GENE EXPRESSION IN PLANKTONIC VERSUS BIOFILM LIFE CYCLE STAGES <u>Shalika D. Silva</u> , Nancy L. Carty, Uzma Qaisar, Abdul N. Hamood, and Michael J. San Francisco	50 – AN EXAMINATION OF THE EFFECTS OF METHYL TRICLOSAN ON EARLY EMRBYONIC DEVELOPMENT IN THE SOUTH AFRICAN CLAWED FROG ( <i>XENOPUS LAEVIS</i> ) <u>Meghan M. Cromie</u> , Mike R. Wages, Ernest E. Smith, and James A. Carr
11:30 – 1:00	<b>LUNCH</b> On Your Own		

<b>SATURDAY PM</b>	<b>VII. NATURAL RESOURCES MANAGEMENT</b> Biology 101	<b>VIII. PLANT &amp; SOIL SCIENCE</b> Biology 106	<b>IX. PROPOSAL</b> Experimental Sciences 120
<b>1:00</b>	51 – CONSERVING CAVE BATS IN THE PHILIPPINES: ASSESSING THE IMPACT OF CAVE DISTURBANCE ON BAT COMMUNITIES <u>Kendra L. Phelps</u> , Reizl Pamaong-Jose, and Tigga Kingston	56 – ASSESSING REGIONAL DIFFERENCES IN PREDATION OF ENDANGERED SPECIES: IMPLICATIONS FROM TEXAS POPULATIONS OF THE ENDANGERED STAR CACTUS <i>ASTROPHYTUM ASTERIAS</i> (ZUCCARINI) LEMAIRE <u>Adam W. Ferguson</u> , Richard E. Strauss, Anna W. Strong, Sandra J. Birnbaum, Jackie M. Poole, Gena K. Janssen, and Paula S. Williamson	59 – HETEROLOGOUS EXPRESSION OF A RICE SUMO E3 LIGASE ENHANCES HEAT TOLERANCE IN TRANSGENIC COTTON <u>Neelam Mishra</u>
<b>1:15</b>	52 – AN AMPHIBIAN’S DILEMMA: WETLAND SITE SELECTION AND COMMUNITY ASSEMBLAGES IN AN URBANIZED SETTING <u>Rasika Ramesh</u> , Kerry L. Griffis-Kyle, and Gad Perry	23 – INDIVIDUAL COTTON FIBERS TENSILE PROPERTIES: WITHIN-SAMPLE INVESTIGATION <u>Farzad Hosseinali</u> , Eric Hequet, and Nouredine Abidi	60 – EXPLORING NON-ADDITIVE EFFECTS IN THE FLAMMABILITY OF FOREST LITTER <u>Rita M. Quiñones-Magalhães</u> and Dylan W. Schwilk
<b>1:30</b>	53 – LANDSCAPE-LEVEL ASSOCIATIONS BETWEEN WATER QUALITY AND GOLDEN ALGA PRESENCE, ABUNDANCE, AND TOXICITY IN RESERVOIRS OF WEST TEXAS <u>Matt VanLandeghem</u> , Mukhtar Farooqi, Greg Southard, and Reynaldo Patiño	57 – ENHANCING COTTON FIBER ELONGATION AND CELLULOSE SYNTHESIS BY MANIPULATING FRUCTOKINASE ACTIVITY. <u>Thiya Mukherjee</u> , Mariana Ivanova, Marisela Dagda, David Granot, and A. Scott Holaday	61 – PHYLOGEOGRAPHY AND MORPHOLOGY OF INSULAR OTTOMAN VIPERS ( <i>MONTIVIPERA XANTHINA</i> ) IN THE EASTERN AEGEAN ISLANDS, GREECE <u>Stephanos A. Roussos</u> , Jeff Ettling, Maria Dimaki, and Llewellyn D. Densmore III
<b>1:45</b>	54 – COMMUNITY RESPONSE TO USE OF PRESCRIBED GRAZING AND TEBUTHIURON HERBICIDE FOR RESTORATION OF SAND SHINNERY OAK ( <i>QUERCUS HAVARDII</i> ) COMMUNITIES <u>Jennifer C. Zavaleta</u> , David A. Haukos, and Clint Boal	24 – EVALUATION OF VARIOUS MEASUREMENTS FOR ASSESSING MATURITY OF COTTON FIBERS <u>Dev R. Paudel</u> , Eric F. Hequet, Nouredine Abidi, Brendan Kelly, Roji Manandhar, and Farzad Hosseinalli	62 – EFFECTS OF PROLONGED DESICCATION ON INVERTEBRATE SEEDBANKS OF PLAYA WETLANDS. <u>Scott M. Starr</u> and Nancy E. McIntyre
<b>2:00</b>	55 – MULTIPLE FACTORS INFLUENCE GENE FLOW IN THE GREAT PLAINS: THE SWIFT FOX AS A CASE STUDY <u>Donelle L. Schwalm</u> , Melanie A. Murphy, Lisette P. Waits, and Warren B. Ballard	58 – CARBON AND NITROGEN CYCLES OF THREE GRAZING SYSTEMS <u>Cody J. Zilverberg</u> , Michael L. Galyean, Jennifer Moore-Kucera, and Vivien G. Allen	63 – CRICETIDS AS A PHYLOGEOGRAPHICAL MODEL FOR UNDERSTANDING SPECIES DIVERSITY IN THE MESOAMERICAN HIGHLANDS <u>Nicté Ordóñez-Garza</u> and Robert D. Bradley
<b>2:15 – 2:45</b>	<b>BREAK</b> Biology Lobby		

<b>SATURDAY PM</b>	<b>X. ECOLOGY</b> Biology 101	<b>XI. EVOLUTION &amp; SYSTEMATICS</b> Biology 106	<b>XII. TOXICOLOGY</b> Experimental Sciences 120
<b>2:45</b>	64 – HETEROSPECIFIC ALARM CALL RECOGNITION AND UTILIZATION IN TIME AND SPACE <u>Amy M. Kuczynski</u> and Kenneth A. Schmidt	68 – PHYLOGEOGRAPHY AND SPECIES-LEVEL DIVERSITY WITHIN THE SOUTHEAST ASIAN ROUND-LEAF BATS (CHIROPTERA: HIPPOSIDERIDAE), BASED ON GENETICS, MORPHOLOGY AND ECHOLOCATION CALL FREQUENCIES <u>Faisal Ali Anwarali Khan</u> , M. T. Abdullah, Ibnu Maryanto, Fahma Wijaya, and Robert J. Baker	72 – EFFECTS OF THYROID ENDOCRINE DISRUPTION ON THE DEVELOPMENTAL MORPHOMETRY OF ZEBRAFISH ( <i>Danio rerio</i> ) <u>Prakash Sharma</u> and Reynaldo Patiño
<b>3:00</b>	65 – SEASONAL AND REPRODUCTIVE DEN SITE FIDELITY IN THE AMERICAN HOG-NOSED SKUNK <u>Christopher E. Pomposelli</u> , Wesley A. Brashear, and Robert C. Dowler	69 – MOLECULAR EVIDENCE FOR PARAPHYLY IN <i>NYCTOMYS SUMICHRASTI</i> : SUPPORT FOR A NEW GENUS OF VESPER MICE? <u>Megan S. Corley</u> , Nicté Ordóñez-Garza, Duke S. Rogers, and Robert D. Bradley	73 – ACUTE AND CHRONIC TOXICITY OF THE HERBICIDE TRIFLURALIN TO TADPOLES OF THE GREEN FROG (LITHOBATES CLAMITANS) <u>Scott M. Weir</u> , Shuangying Yu, and Christopher J. Salice
<b>3:15</b>	66 – COMBINED IMPACTS OF PREDATOR STRESS AND PREDICTED CLIMATE INDUCED CHANGES IN TEMPERATURE AND SALINITY ON FRESHWATER GASTROPODS <u>Jamie Suski</u> , Christopher Salice, Stephanie Plautz, and Reynaldo Patiño	70 – A MORPHOLOGICAL COMPARISON OF THE LAND SNAILS <i>HOLOSPIRA MONCLOVANA</i> AND <i>HOLOSPIRA PICTA</i> (GASTROPODA: UROCOPTIDAE) FROM NORTHERN MEXICO USING X-RAY COMPUTED TOMOGRAPHY <u>Rigel K. Rilling</u> , Ned E. Streth, and Alfonso Correa-Sandoval	74 – ACUTE TOXICITY OF CHLOROTHALONIL TO AFRICAN CLAWED FROG <i>XENOPUS LAEVIS</i> <u>Shuangying Yu</u> , Mike Wages, George P. Cobb, and Jonathan D. Maul
<b>3:30</b>	67 – NITROGEN FACILITATED INVASION OF <i>PHALARIS ARUNDINACEA</i> INTO <i>CAREX STRICTA</i> -DOMINATED WETLANDS <u>Elizabeth F. Waring</u> and A. Scott Holaday	71 – SYSTEMATICS OF <i>RHINOLOPHUS PEARSONII</i> IN SOUTHEAST ASIA. <u>Howard M. Huynh</u> and Judith L. Eger	75 – LEACHING OF PHTHALATE ESTER PLASTICIZERS INTO AQUATIC MESOCOSMS COMPOSED OF VARYING PLASTICS <u>Kimberly J. Wooten</u> , Scott M. Weir, Philip N. Smith, and Christopher J. Salice
<b>3:45 – 4:00</b>	<b>BREAK</b> Biology Lobby		
<b>4:00 – 5:00</b>	<b>PLENARY PRESENTATION</b> Biology 101  ECOLOGICAL ZOOGEOGRAPHY OF BATS: THERE IS MORE TO IT THAN FLYING. <u>Celia López-Gonzalez</u>		
<b>5:00 – 6:00</b>	<b>COLLECTIONS &amp; EXHIBIT VIEWING</b> International Cultural Center		
<b>6:00 – 9:00</b>	<b>AWARDS BANQUET</b> International Cultural Center		

# ABSTRACTS

## 1 – POPULATION GENETICS OF THE AMERICAN CROCODILE IN COIBA MARINE NATIONAL PARK, PANAMA

Ashish Bashyal<sup>1\*</sup>, Miryam V. Anaya<sup>1</sup>, and Llewellyn D. Densmore<sup>1</sup>

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The critical component of a conservation program is the preservation of genetic diversity which necessitates information about the level of heterozygosity, genetic population structure as well as gene flow. The population genetics studies provide valuable information on these aspects and therefore are of great interest in conservation programs. This study was conducted to assess genetic structure and gene flow patterns among the populations of American crocodile (*Crocodylus acutus*) from Coiba Island and the continental mainland from where this island was separated at the end of the last glacial period during the Late Pleistocene. Individuals from different localities in mainland ( $N=30$ ) and in Coiba Island ( $N=113$ ) were genetically characterized by PCR amplifying highly polymorphic microsatellite loci developed for *C. acutus*. The model based clustering analysis was performed on microsatellite data which revealed the presence of three genetic clusters among the sampled populations. The F-statistics showed significant pair wise  $F_{st}$  values ( $P<0.05$ ) between mainland and Island populations suggesting some genetic sub-structuring between these populations.

## 2 – PARTIAL PURIFICATION AND CHARACTERIZATION OF 4T1 MURINE BREAST CANCER CELL CYTOTOXINS FROM *CURCUMA LONGA*

Trevor A. Burrow<sup>1\*</sup>, Libby M. Saultz<sup>1</sup>, Jenna L. Wilson<sup>1</sup>, Stephanie D. Whitaker<sup>1</sup>, Jarrett H. Ross<sup>1</sup>, Adam J. Reinhart<sup>1</sup>, and Gary O. Gray<sup>1</sup>

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Turmeric (*Curcuma longa*), a plant used in Ayurvedic medicine, contains bioactive polyphenols. Previous work demonstrated that ethanolic extracts of turmeric were cytotoxic to cultured 4T1 murine breast cancer cells. Objectives of this study were to identify and characterize the 4T1 cell cytotoxins. Powdered turmeric was extracted by reflux in dichloromethane. Dichloromethane extract was precipitated with hexane, and precipitated material was subjected to silica gel TLC. TLC bands were scraped, eluted in DMSO and analyzed via UV-visible spectroscopy, HPLC and MALD-mass spectrometry. Cytotoxicity of eluted TLC bands was determined (MTS assay and Glow assay) on cultured 4T1 cells. Two cytotoxic TLC bands BV1 and BV2 were observed, consistent with the molecular weights of curcumin and demethoxycurcumin, respectively. Additional characterization is ongoing.

## 3 – EFFECT OF LATITUDE IN BAT ASSEMBLAGES FROM WESTERN ECUADOR

Juan P. Carrera-E.<sup>1\*</sup>, Noe de la Sancha<sup>2</sup>, Nicté Ordoñez-Garza<sup>1</sup>, Sergio Solari<sup>3</sup>, Carl J. Phillips<sup>1</sup>, and Robert J. Baker<sup>1</sup>

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Ecuador is a biodiversity hotspot valuable for scientific research and conservation activities. The western side of the country is a complex mosaic of ecosystems due to the confluence of the Choco-Darién humid region from the north, the Peruvian-Chilean dry forest from the south, and the presence of the Andes Mountains. This complexity has allowed the coexistence of more than 70 species of phyllostomid bats including endemic and geographically restricted taxa. This study aimed to evaluate the effect of latitude in phyllostomid assemblages along western Ecuador. A total of 1,326 records pertaining to 50 species from 15 sampling localities (humid, semi-dry, and dry), surveyed in 2001 and 2004, were analyzed. Basic diversity indices were calculated to describe diversity, dominance, richness, and evenness for each locality. A multivariate approach was conducted to assess differences in biodiversity and latitude. A cluster analysis of similarity, using Jaccard's similarity algorithm, was conducted to calculate and visualize similarity between sampling localities along the latitudinal gradient. Finally, a discriminant



function analysis followed by a multivariate analysis of variance were estimated to test if abundances between collecting sites were significantly different ( $p=0.05$ ) between groupings. Our results showed significant differences among phyllostomid assemblages in Western Ecuador and the presence of two distinct clades, one grouping humid localities and other including semi-dry and dry localities. These findings support the hypothesis that latitude is an important component in the organization of mammal assemblages in the Neotropic.

#### **4 – THE EFFECTS OF TRICLOSAN ON ATLANTIC CROAKER’S ANTI-PREDATOR STRATEGIES**

Apollo Castillo<sup>1\*</sup>, Tiffany Hopper<sup>1</sup>, and Sandra Diamond<sup>1,2</sup>

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Triclosan is an antibacterial and antifungal compound that is used in many of today’s personal care products. Triclosan is entering into the aquatic environment at an increasing rate causing harm to aquatic life. The purpose of this project was to determine the effects of triclocan on Atlantic croaker (*MICROPOGONIAS UNDLUATUS*), an estuarine fish, and their anti-predator strategies. My hypothesis was that fish exposed to triclosan would spend more time in non-bold strategies based on the effects on predator avoidance recorded in other species. Out of 30 fish, 15 were exposed to triclosan via triclosan-infused food pellets, while 15 were named the “control group” and fed normal food. This food regiment was administered for 14 days. The fish were recorded on video while being chased by a simulated predator both before and after the 14-day feeding period. The videos were then analyzed to record the croaker’s anti-predator strategies which included: running (swimming around the tank’s perimeter), hiding (staying in one place), cutting across the center of the tank, and “turn gambits (doubling-back). The strategies were classified as bold (cutting across and “turn gambits”) and non-bold (running the perimeter and hiding) strategies. The findings suggest that the consequences of exposure to triclosan may depend on the predators’ ability to consume less bold fish.

#### **5 – BAT SPECIMENS FROM TEXAS DEPARTMENT OF STATE HEALTH SERVICES ARE A VALUABLE RESOURCE FOR REFINING (OR DOCUMENTING) SPECIES DISTRIBUTION**

Krysta D. Demere<sup>1\*</sup> and Loren K. Ammerman<sup>1</sup>

<sup>1</sup>Department of Biology, Angelo Sate University – San Angelo, Texas 76909

Bats submitted to the Texas Department of Sate Health Services for rabies virus testing have been a useful tool in studying the distribution of many species within the state. Over 8,300 rabies-negative specimens were collected from 2005 to 2011 and a majority of them were identified using morphological features. From a subset of these specimens we extracted tissues for the frozen tissue collections at Texas Tech University and Angelo State University, prepared fluid-preserved vouchers, and deposited them in the Natural Science Research Lab at Texas Tech University. Each specimen’s location was compared to the known distribution of the species to determine if it resulted in a new county record or range extension. Counties which had literature documentation of a species but no known voucher specimens were considered county records as well. Here-in we report data on fourteen species from 73 Texas counties. A total of 112 new county records and five range extensions were documented including one phyllostomid (*Choeronycteris mexicana*), twelve vespertilionids of seven genera (*Myotis*, *Lasiurus*, *Lasionycteris*, *Perimyotis*, *Eptesicus*, *Nycticeius*, and *Antrozous*) and one molossid (*Nyctinomops macrotis*). Although the specimens in this study were not obtained by traditional methods, they document important occurrences of bat species in the state of Texas.

## **6 – CHARACTERIZATION OF *HAT* AND *PIGGYBAC* TRANSPOSABLE ELEMENTS IN MOUSE EARED BATS (GENUS: *MYOTIS*)**

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Transposable elements, mobile DNA sequences present in virtually all organisms, have been previously thought to be inactive in mammals. However, current studies have revealed the first evidence of recent *piggyBac* and *hAT* activity in *Myotis lucifugus*. The objective of this study was to further characterize five transposable elements in various *Myotis* bats to investigate the abundance, diversity, and viability of these transposable elements in *Myotis* species. The five elements were confirmed present in 10 species (*M. cilolabrum*, *M. californicus*, *M. velifer*, *M. yumanensis*, *M. lucifugus*, *M. thysanodes*, *M. volans*, *M. austroriparius*, *M. keaysi*) spanning the new world clade of *Myotis* using PCR. Sequence data focusing on the transposase region has been collected and analyzed for two of the elements; *hAT\_3* data set contains 1200 bp and *piggyBac\_1* contains 942 bp. The older *hAT\_3* element has a mean sequence diversity of 1.88%; whereas the younger *piggyBac\_1* element has little diversity (.01%). A small number of polymorphic sites within the sequence of a single individual suggest multiple copy types of the *hAT\_3* element; these polymorphic sites were not evident in the *piggyBac\_1* element. These results support the hypothesis that the *piggyBac* element is a relatively young transposon and a recent addition to the *Myotis* genome. However, data from this study are inconclusive on the possible ongoing activity of *piggyBac* and *hAT*; screening fresh *Myotis* tissues for the presence of transposase mRNA would be helpful in elucidating the activity of these transposons.

## **7 – FIRE SURVIVAL STRATEGIES OF OAKS IN THE TRANS-PECOS MOUNTAINS**

Maria S. Gaetani<sup>1\*</sup> and Dylan W. Schwilk<sup>1</sup>

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

Trees may survive fire through persistence of above or below ground structures; investment in bark aids in the first while investment in carbohydrate storage aids in the second. Investment in defense structures comes at a cost, necessitating tradeoffs. To allow comparison between species we standardized bark thickness across time using allometry. We hypothesize that relative investment changes with fire regime, with delayed investment in bark and early investment in carbohydrates under low frequency and high severity fire regimes. Common oaks of the Trans-Pecos Mountains (*Quercus emoryi*, *Q. gambelii*, *Q. gravesii*, *Q. grisea*, *Q. hypoleucoides*, *Q. muehlenbergii*, *Q. pungens*) were sampled at three sites with mixed fire regimes: the Chisos Mountains, the Davis Mountains and the Guadalupe Mountains. Bark thickness was measured on 30 individuals per species per range following Adams and Jackson's (1995) contour method, involving tracing, coring and digitizing cross sections. Carbohydrate concentration sampling was carried out after initial leaf flush and before secondary shoot development. Investment in each trait was standardized by size and compared using major axis regression. Through expanding our understanding of fire survival traits we are better equipped to determine species success or failure under novel disturbance regimes.

## **8 – UTILIZING A VIRAL GENE TOWARDS GENERATING INSECT-RESISTANT *ARABIDOPSIS* AND COTTON**

Saranya Ganapathy<sup>1\*</sup>, Guoxin Shen<sup>1</sup>, Hong Zhang<sup>1</sup>, and Shan L. Bilimoria<sup>1</sup>

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A key factor determining agricultural productivity is yield reduction due to insect pests. Approximately 14% of US crops are lost to insect pests each year. Insect resistance and environmental damage due to chemical pesticides are of increasing public concern. This has led to renewed interest in biological approaches to pest control. The use of genetically modified crops is an effective pest management strategy in agriculture. Therefore, identification of novel insecticidal genes other than Bt toxins as plant-incorporated protectants is essential. Our research group is working on viral insecticidal toxins in the generation of insect-resistant transgenic plants. Chilo iridescent virus (CIV, family *Iridoviridae*) is the only virus known to induce mortality and metamorphic deformity in the cotton boll weevil. CIV also

reduces aphid populations, but does not infect mammalian cells. We have identified and isolated a CIV gene responsible for insecticidal activity and have designated it *iridoptin*. Preliminary studies by our group showed that iridoptin is responsible for apoptotic blebbing and host shutoff in insect cell lines and induces mortality in the cotton aphid, *Aphis gossypii* Glover. We wanted to test our hypothesis that over-expression of the iridoptin gene in *Arabidopsis* and cotton would confer insect resistant phenotype in transgenic plants. We have created transgenic *Arabidopsis* and cotton plants that express iridoptin and we are studying these plants in greenhouse conditions. Most updated results will be presented at the TTABSS.

## **9 – THE PRESENCE OF EPIPOLYTHIODIOXOPIPERAZINE (ETP) TOXIN IN *BATRACHOCHYTRIUM DENDROBATIDIS***

Amanda M. Hicks<sup>1\*</sup> and Michael J. San Francisco<sup>1</sup>

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

The continual decline of amphibians worldwide has been partially attributed to the fungus, *Batrachochytrium dendrobatidis*. This fungus is known to cause inflammation and thickening of the keratinized layer of amphibian skin causing a disturbance in the osmotic balance within the amphibian leading to cardiac arrest. The action by which *B. dendrobatidis* penetrates the skin and causes disease is unknown. Epipolythiodioxopiperazine (ETP) class of toxins has been shown to increase the virulence of fungi and is regulated by a gene cluster of roughly 8 to 10 genes. Since *Aspergillus fumigatus* is known to produce gliotoxin, a specific ETP toxin, through the production of core biosynthetic enzymes; we hypothesize that the presence and expression of core biosynthetic enzymes for gliotoxin in *B. dendrobatidis* would indicate that this fungus can produce the ETP-class toxin. By using NCBI BLAST and reverse transcriptase-PCR we have observed the expression of seven of the genes that make up the cluster required to produce ETP toxins. Quantitative PCR and HPLC techniques will be conducted to further validate the presence and expression of the ETP toxin in *B. dendrobatidis*. These studies will contribute to our understanding of the mechanism(s) by which *B. dendrobatidis* is able to kill amphibians and can also aid in understanding other pathogenic fungi.

## **10 – ACUTE RADIATION TOLERANCE FOLLOWING *IN UTERO* LOW-DOSE IRRADIATION**

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Following the Chernobyl accident in 1986, widespread fear of congenital malformations led to elective abortions of hundreds of thousands of human pregnancies across Europe. The purpose of this study was to investigate the effects of low-dose ionizing radiation exposures *in utero*. Pregnant laboratory mice (BALB/c) were exposed to low-dose Chernobyl radiation {10-13 mSv (Sievert) per day for 10 days} during organogenesis. The progeny were born and weaned in an uncontaminated laboratory, then exposed to an acute radiation dose (2.4 Sv). Analysis of our endpoints (litter dynamics, DNA damage, bone marrow stem cell function, immune cell production, and gene expression) suggests that a low-dose (100-130 mSv) *in utero* exposure to ionizing radiation is not deleterious to the offspring. Rather DNA damage, immune cell production, and gene expression results suggest a radioadaptive response was elicited by the *in utero* exposure with respect to the harmful effects of the subsequent acute radiation exposure.

## 11 – METHOD FOR ESTIMATING RAPTOR FLIGHT HEIGHT TO CALCULATE COLLISION RISK PRIOR TO THE DEVELOPMENT OF A WIND ENERGY FACILITY

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Commercial wind energy facilities lead the nation in renewable energy production with Texas as the primary contributor. Wind energy development poses a unique set of environmental concerns including indirect (e.g., displacement of species) and direct (e.g., mortality) impacts. Raptors are a specific concern because they are long lived, have a low reproductive rate and have been observed to be relatively common fatalities at operating wind facilities. Deaths and injuries are likely tied to flight behaviors that would lead birds within the rotor swept area and thus increase the probability of collision with turbine blades. Data are often poorly estimated in pre-construction assessments due to the inherent difficulty in accurately estimating flight height in the absence of wind turbines. The accurate estimate of raptor flight heights in the pre-development stage would allow the calculation of the mortality risk to raptors and contribute to making informed project siting decisions. Here we present a method that allows field biologists to estimate flight heights more consistently and accurately than previously used methods. We combine point-specific survey maps, digital laser rangefinders and clinometers with a height conversion table to group flight heights into collision risk categories. We apply this method during 25-minute surveys and use one-minute interval (i.e., instantaneous) sampling. Compared to conventional methods that solely use ocular estimates when a raptor is first detected and does not consider sequential observations, this method standardizes flight height estimates between surveyors and allows for more analytical techniques during data analyses to assist in siting wind energy projects.

## 12 – TORRENT MINNOW TAXONOMY TIDY UP: SYNONYMIZATION OF *PSILORHYNCHUS GRACILIS* RAINBOTH 1983 WITH *PSILORHYNCHUS NUDITHORACICUS* TILAK & HUSAIN 1980

Laci E. Jazisek<sup>1\*</sup>, Drew E. Dittmer<sup>1,2</sup> and Kevin W. Conway<sup>1,2</sup>

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Members of the Torrent Minnow genus *Psilorhynchus* (Teleostei: Psilorhynchidae) are small fishes that inhabit the benthic region of swift to torrential mountain streams throughout South Asia, including India, Nepal, Bangladesh, Myanmar, and parts of adjacent China. *Psilorhynchus sucatio* (Hamilton 1822) and *P. gracilis* Rainboth 1983 are sympatric throughout most of their range in the Ganges and Brahmaputra drainages of North East India, Nepal, and Bangladesh, but are easily distinguished based on a number of external characteristics (morphometrics and meristics) and osteological features. Two subspecies of *P. sucatio* have been recognized, *P. s. damodarai* David 1953, and *P. s. nudithoracicus* Tilak & Husain 1980, all currently placed in the synonymy of *P. sucatio*. Principal component analysis of 22 external measurements obtain from 132 specimens (*P. sucatio*, n=83; *P. gracilis*, n=49) separated most individuals of *P. sucatio* from *P. gracilis* in PCA morphospace except for a small number of individuals representative of *P. s. nudithoracicus*, which clustered together tightly with *P. gracilis*. A set of 8 meristic characters obtained from the same individuals revealed a number of differences between *P. gracilis* and *P. sucatio* except for those individuals representative of *P. s. nudithoracicus*, which exhibit identical counts to *P. gracilis*. Our results support the hypothesis that the names *P. s. nudithoracicus* and *P. gracilis* refer to the same species. In order to stabilize torrent minnow taxonomy we place *P. gracilis* in the synonymy of *P. s. nudithoracicus*, remove *P. s. nudithoracicus* from the synonymy of *P. sucatio* and elevate *P. nudithoracicus*.

### **13 – CTR9 IS A CELL CYCLE AND CELL SIZE REGULATOR IN YEAST (*SACCHAROMYCES CEREVISIAE*) WITH IMPLICATIONS IN ONCOGENESIS**

Thivakorn Kasemsri<sup>1\*</sup>, Anthony McDowell<sup>1</sup>, Huzefa Dungrawala<sup>1</sup>, Lesley Abraham<sup>1</sup>, Hui Hua<sup>1</sup>, Jill Wright<sup>1</sup>, Jessica Stilwell<sup>1</sup>, and Brandt Schneider<sup>1</sup>

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Cell size is regulated during development and disease conditions and recently, aging studies highlighted its importance in lifespan regulation in the budding yeast *S. cerevisiae*. Precise G1-phase cell cycle controls regulate the transition from G1 to S phase at an event called START (equivalent to RESTRICTION POINT in mammalian cells) and couples "critical cell size" to proliferation. Two genetic screens for cell size mutants have helped identify the genetic determinants of START transition and delineate some of the mechanisms behind cell cycle transitions. We recently screened the remaining ~9% of the yeast gene knockout database which had not been released previously. We identified 9 and 6 new strong size mutants in logarithmic and saturation phases, respectively. Time-lapse digital microscopy revealed changes in the "critical cell size" to be causing the respective cell size phenotypes. One such mutation was in *CTR9* which is a subunit of the PAF complex which associates with RNA Pol-II to form the transcription apparatus for subsets of cell-cycle regulator genes. In particular, the size phenotype of *ctr9Δ* suggests a potential role in the process of replicative aging. Furthermore, through its role in the human PAF complex and direct association with the MLL gene and protein, *CTR9* plays a direct role in the pathogenesis the most common childhood leukemia, Acute Lymphoblastic Leukemia (ALL). Based on the association of *CTR9* with many cancers and its involvement in cell cycle control, *CTR9* could be a potential target for further drug development and aging studies.

### **14 – CHEMOTHERAPEUTIC SENSITIZATION OF LEPTOMYCIN B RESISTANT LUNG CANCER CELLS BY PRETREATMENT WITH DOXORUBICIN**

Chuanwen Lu<sup>1\*</sup>, Changxia Shao<sup>1</sup>, Everardo Cobos<sup>2</sup>, Kamaleswar P Singh<sup>1</sup>, Weimin Gao<sup>1,2</sup>

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The development of novel targeted therapies has become an important research focus for lung cancer treatment. Our previous study has shown leptomycin B (LMB) significantly inhibited proliferation of lung cancer cells; however, p53 wild type lung cancer cells were resistant to LMB. Therefore, the objective of this study was to develop and evaluate a novel therapeutic strategy to sensitize LMB-resistant lung cancer cells by combining LMB and doxorubicin (DOX). Among the different treatment regimens, pretreatment with DOX (pre-DOX) and subsequent treatment with LMB to A549 cells significantly decreased the 50% inhibitory concentration (IC<sub>50</sub>) as compared to that of LMB alone (4.4 nM vs. 10.6 nM,  $P < 0.05$ ). Analysis of cell cycle and apoptosis by flow cytometry further confirmed the cytotoxic data. To investigate molecular mechanisms for this drug combination effects, p53 pathways were analyzed by Western blot, and nuclear proteome was evaluated by two dimensional-difference gel electrophoresis (2D-DIGE) and mass spectrometry. In comparison with control groups, the levels of p53, phospho-p53 (ser15), and p21 proteins were significantly increased while phospho-p53 (Thr55) and survivin were significantly decreased after treatments of pre-DOX and LMB ( $P < 0.05$ ). The 2D-DIGE/MS analysis identified that sequestosome 1 (SQSTM1/p62) had a significant increase in pre-DOX and LMB-treated cells ( $P < 0.05$ ). In conclusion, our results suggest that drug-resistant lung cancer cells with p53 wild type could be sensitized to cell death by scheduled combination treatment of DOX and LMB through activating and restoring p53 as well as potentially other signaling pathway(s) involving sequestosome 1.

## **15 – ASSESSMENT OF HANTAVIRUS AND ARENAVIRUS ANTIBODY PREVALENCE AND ASSOCIATED RODENT SPECIES IN DICKENS COUNTY, TEXAS**

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A trapping program was implemented to sample rodents seasonally in Dickens County, Texas, from June 2008 to April 2009. A total of 292 rodents were collected using live traps (trapping success rate = 20.2%). Blood samples collected from the specimens were tested for evidence of IgG antibodies to New World hantaviruses and arenaviruses. A total of 30 individuals (10.3% of captured rodents) from four species, spanning three genera, tested positive for viral antibodies. Twenty-one individuals (7.2% of captured rodents) tested positive for hantavirus IgG antibodies, and nine individuals (3.1% of captured rodents) tested positive for arenavirus IgG antibodies. A statistically significant, nonrandom distribution of antibody positive rodents was observed between trapping localities.

## **16 – ROLAND SPRINGS RANCH LOCALITY 1, AN EARLY PLEISTOCENE FAUNA FROM THE SOUTHERN PLAINS OF TEXAS**

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Roland Springs Ranch (RSR) Locality 1 is situated on Turtle Creek, an ephemeral contributory to the Clear Fork of the Brazos River, on the Southern Plains within the western Rolling Plains of Texas. Faunal material is encased within gleyed sand in an ancient channel. The surface of this ancient drainage and the plotted positions of specimens, provide an opportunity to study the deposition patterns of a small early Pleistocene stream. Over 50 taxa have been identified at least to the family level, demonstrating a strong record of biodiversity. Multiple species of *Hesperotestudo* and Emydid turtles, primarily *Chrysemys picta*, are the dominant forms in the assemblage. Remains of the three-toed horse *Nannippus peninsulatus* are common, while those of a representative of the modern genus, *Equus simplicidens*, are rare. Carnivores are represented by *Taxidea taxus*, *Buisinctus breviramus*, and *Canis lepophagus*, as well as a small *Miracinonyx*, referred to *M. trumani*. Avian material is abundant, including primarily Passeriformes but also members of Ardeidae, Corvidae, and Accipitridae, and an extinct species of *Meleagris*. Microfaunal remains are abundant and diverse. An approximate age is provided by faunal composition. *Ogmodontomys poaphagus*, *Prodipodomys centralis*, *Geomys (Nerterogeomys) minor*, *Scalopus (Hesperoscalops) cf. rexroadi*, and a small *Sigmodon minor/medius* indicate a middle to late Blancan age. The referred identifications of *Miracinonyx trumani* and *Lepus* would indicate a latest Blancan age, while *Nannippus peninsulatus* is confined to the late Blancan. Viewed together, these animals represent a late Blancan fauna of earliest Pleistocene age (2.6 – 1.8 million years ago).

## **17 – THE UTILITY OF ZONADHESIN IN EXAMINING A POTENTIAL ISOLATING MECHANISM IN THREE PAIRS OF RODENT SPECIES**

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Zonadhesin (ZAN) is a multi-domain, transmembrane, species specific sperm protein that is crucial in the binding of the spermatozoa with the zona pellucida of the egg during fertilization (Hardy and Garbers 1995). The structurally unique domains of this protein, especially the additional domain in rodents, suggest the essential function is that of sperm adhesion to the egg's outer layer due to complementary change. ZAN is one such molecule that has undergone domain expansion and positive selection in mammals (Hunt et al. 2005). Consequently, the protein may play an important role in protecting a species gene pool by preventing or reducing the production of hybrid offspring. Sequencing the protein from three pairs of rodent species (*Geomys bursarius* and *G. knoxjonesi*, *Neotoma micropus* and *N. floridana*, and *Spermophilus mexicanus* and *S. tridecemlineatus*) known to produce hybrids with varying levels of



success and performing a comparative study will determine if this protein acts as an isolation mechanism in these species. By sequencing the ZAN protein in both the parental types, as well as hybrid individuals, we can determine if this protein sequence is conserved, at what level of conservation, and if ZAN might be a possible isolating mechanism for these species.

### **18 – THE WHITE RABBIT: MATURING COTTON FIBER ON TIME**

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Cotton fiber maturity is a critical determinant of fiber yield and quality which in turn determines the quality of yarns and fabrics produced from the fiber. Cotton fibers are among the longest and fastest growing single-cell types in the plant kingdom that have evolved a thick secondary cell wall that is, at maturity, composed of nearly 100% cellulose, one of the most abundant biopolymers in nature. Fiber maturity is a difficult trait to study due the large genetic by environmental interaction that can result in immature fibers from even the top performing cultivars. Developed in 1990, the *immature (imm)* mutant is an isogenic line of the genetic standard Texas Marker1 (TM1) and produces genetically immature fibers. Using *imm* as enabling tool, the direct molecular events contributing to fiber maturity can be studied independent of the environmental interaction. Previous research has shown that Sucrose synthase (Sus), rather than invertase, is responsible for generating the substrate for cellulose synthesis, UDP-glucose. It has also been shown in mung bean, that Sus associates directly with the cellulose synthase rosette to streamline delivery of substrate allowing the cellular machinery to quickly lay down massive amounts of secondary cell wall cellulose (Fuji et al., 2010). HPLC and GC analyses have shown that this single homozygous recessive mutation most likely resides in the starch and sucrose metabolism pathway and is likely a sucrolytic enzyme.

### **19 – CYTOTOXIC AND APOPTOTIC EFFECTS OF *ZINGIBER OFFICINALEA* (GINGER ROOT), *CURCUMA LONGA* (TURMERIC), *SANGUINARIA CANADENSIS* (BLOOD ROOT) AND *WITHANIA SOMNIFERA* (ASHWAGANDHA) IN 4T1 MURINE AND MCF-7 HUMAN BREAST CANCER CELL LINES**

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Ethanollic extracts of medicinal plants were tested to determine their cytotoxic effects on the 4T1 murine and MCF-7 human breast cancer cell lines. The cytotoxic effects of the extracts were measured using MTS and Cell Titer-Glo luminescent cell viability assays. Dose response tests were conducted to determine the IC<sub>50</sub> values for cytotoxic extracts. Ethanollic extracts of *Zingiber officinalea* (Ginger Root), *Curcuma longa* (Turmeric), *Sanguinaria canadensis* (Blood Root) and *Withania somnifera* (Ashwagandha) were found to be cytotoxic to both cell lines. Crude and further fractionated extracts that were found to be cytotoxic to 4T1 or MCF-7 cells were assayed for apoptosis using a caspase Glo-3/7 assay and a western blot assay of caspase-3 protein.

### **20 – A PRELIMINARY RESTRICTION MAP OF THE A-S FRAGMENT FROM *BRASSICA RAPA* CV RAPID CYCLING**

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The Fast Plant, *Brassica rapa* cv. rapid cycling, is used as a teaching tool for genetic concepts in high school and college Biology classes. Fast plants complete their life cycle in 40 days, are easy to grow, and have thin tissues with very little secondary metabolite production which simplifies DNA extraction. There are several phenotypic mutations available; however there is no known map of the chloroplast genome. This project was started to begin a map of the chloroplasts genome in fast plants. Universal chloroplast PCR primers (Petit et al., 1995) for fragments forward *A* and reverse *S* were used to amplify the *AS* fragment of the *Brassica rapa* chloroplast genome. The PCR product was digested using restriction

enzymes BssKI, MboII, ScrFI, and HinFI which provided 1, 2, 3 and 4 restriction sites (respectively) within the AS fragment. Preliminary restriction enzyme maps for each enzyme of the AS fragment of the chloroplast genome of *Brassica rapa* cv. rapid cycling will be presented.

## **21 – MICROBIAL AND NUTRIENT DYNAMICS IN RESPONSE TO TEMPERATURE IN THE CHIHUAHUAN DESERT**

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As daily temperature range of air (DTR<sub>air</sub>) has shown the strongest decline in deserts worldwide and is anticipated to have concomitantly reduced the daily temperature range of soil (DTR<sub>soil</sub>), we are interested in whether DTR<sub>soil</sub> regulates microbial and plant dynamics in deserts. Despite that DTR<sub>soil</sub> near the soil surface of desert soils fluctuates up to 40 °C in summer, the role of DTR<sub>soil</sub> in regulating ecosystem function has been largely ignored. We reduced DTR<sub>soil</sub> in ten 3 x 4 m plots using 50% polyethylene cloth suspended on a PVC frame. Over a five-year period, microbial biomass C (MBC) and activity (CO<sub>2</sub> efflux rates) were greater (*ca.* 65% for both) in shaded plots compared to control plots and exhibited seasonal dynamics that corresponded to water availability, with greater responses in the “monsoonal” season (late summer/fall) compared to the drier spring season. Soil available N levels (NO<sub>3</sub><sup>-</sup>-N and NH<sub>4</sub><sup>+</sup>-N) were generally lower in shaded plots compared to treatment plots, concomitant with greater N incorporated into microbial biomass in shaded plots. The dominant plant, *Larrea tridentata* (L.), has not altered its physiological activity in response to the reduction in nutrient levels or more stable soil temperatures, which suggests that deserts will temporarily be a greater C source, thereby providing a positive feedback to the warming trend. This study demonstrated the importance of DTR<sub>soil</sub> in regulating belowground microbial dynamics, thereby advocating the inclusion of this overlooked variable in models of C and N balance of desert ecosystems.

## **22 – VITAMIN E PROTECTS BENZO(A)PYRENE -INDUCED CYTOTOXICITY THROUGH INHIBITION OF PHOSPHORYLATION OF P53 AND P21**

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Reactive oxygen species (ROS), caused by activation of Benzo(a)pyrene (BaP) by CYP1A1 enzyme play an important role in BaP induced carcinogenesis. The tumor suppressor protein p53 is a redox active transcription factor. The objective of this study is to examine the p53 expression change after BaP exposure in lung epithelial cell, BEAS-2B, and to explore the possible protective effect of antioxidant vitamin E (VE). From the cytotoxicity assay (MTT) assay, the BaP induced cell death can be inhibited by VE (20 μM) when cells were exposed to a low concentration of BaP (1.25 – 10 μM). A total of nine different proteins involved in p53 function including total and phospho-p53 (Ser15 and Thr55), p53 nucleocytoplasmic shuttling factors (CRM1, Ran, RCC, and transportin1), and p53 downstream targets (p21 and survivin) were screened by multi-blot. Our data revealed that only phospho-p53 (Ser15) and p21 expression level were significantly up-regulated after BaP exposure as compared to the control (p<0.05). From the individual western-blot, the up-regulation of phospho-p53 (Ser15) and p21 after BaP exposure showed a dose-response effect as compared to the control (p<0.05). An interesting finding was that VE suppressed BaP-induced phospho-p53 (Ser15) and p21. These results suggest that BaP could reduce cell viability possibly through increasing phospho-p53 (Ser15) level and p21 expression, and VE can act as protector by suppressing BaP-induced increase of phospho-p53 (Ser15) and p21. Further experiments are being pursued to elucidate the role of these protein(s)/pathway(s) in BaP transformed BEAS-2B cells.

## **23 – INDIVIDUAL COTTON FIBERS TENSILE PROPERTIES: WITHIN-SAMPLE INVESTIGATION**

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The goal of this research is to determine the relationship between individual cotton fibers tensile properties and their length, maturity, and fineness, within-sample. For this regard, six samples were selected among 104 reference cotton samples and each one was sorted into seven length groups using the array method. Tensile properties of each length group were tested using FAVIMAT<sup>®</sup>, individual fiber tensile tester. In order to measure their maturity-ratio and fineness, samples were examined using Advanced Fiber Information System (AFIS) Pro-2. For all samples, within-sample, short cotton fibers have higher propensity to break on the average. Also, AFIS results indicate that longer fibers, within a sample of processed cotton fibers, are more mature on the average. It can be said that throughout mechanical processing, the least mature cotton fibers may be broken into smaller segments.

## **24 – EVALUATION OF VARIOUS MEASUREMENTS FOR ASSESSING MATURITY OF COTTON FIBERS**

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Fiber maturity, degree of secondary cell wall thickening, is one of the most important quality and processing parameters of cotton. Immature fibers have low dye uptake, produce fabric defects, and increase waste. Breeders, farmers, spinners, and textile producers desire cotton that is mature. However, fast and reliable methods to measure maturity that fit in the current breeding and marketing systems are not available. The reference method to measure fiber maturity is the cross-section method, where 1µm thick cross-sections are evaluated under microscope. It is time consuming, tedious, and impractical for high volume measurement of fiber maturity. Interest is rising towards rapid routine measurements of fiber maturity such as the Advanced Fiber Information System (AFIS) and the Cottonscope. AFIS individualizes and presents the individual fibers to an electro-optical sensor in order to measure maturity of the fibers. The Cottonscope uses polarized light microscopy and image analysis to calculate the maturity of fiber snippets. 104 reference cotton samples were tested with these three methods to assess the potential and capabilities of the maturity measurements. Cottonscope maturity measurements show very good correlations with the reference method. Unlike other methods, cottonscope requires a very small sample size (50 mg) so it can be used in various cases where we only have access to a small sample. Cottonscope results are repeatable and a single test can be completed in less than 1 minute. As compared to cross-section method and AFIS, cottonscope shows a commercial potential to be used for determining maturity of cotton.

## **25 – HABITAT ASSOCIATIONS AND ABUNDANCE ESTIMATES OF NATIVE AND EXOTIC FRESHWATER SNAILS IN A WEST TEXAS SPRING**

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Isolated springs in West Texas are fragile systems often with high levels of endemism. The two biggest threats to these systems are habitat loss and invasion by nonnative species. San Solomon Springs, located in Balmorhea State Park, is a refuge for native and endangered aquatic species. Two native snail species, which are candidates for federal listing, the Phantom Cave Snail (*Pyrgulopsis texana*) and the Phantom Spring tryonia (*Tryonia cheatumi*), have a very limited distribution and rely on the springs at Balmorhea. San Solomon Springs has also been invaded by two exotic snails, the red rim melania (*Melanoides tuberculata*) and the quilted melania (*Tarebia granifera*). To investigate the snail community and species habitat correlations at Balmorhea State Park, we measured snail density and habitat parameters in 396

randomly generated 0.04 m<sup>2</sup> quadrats from May 2010 to May 2011. The most common snail in the park was the native *Pyrgulopsis texana*, which had an estimated abundance of 3,853,650 individuals in the park. The least abundant snail was the native *Tryonia cheatumi*, which had an estimated abundance of 47,733 individuals. For *T. granifera* and *M. tuberculata* the variables that explained the most variation in density were depth, and substrate. Densities were greater in fine grain and pebble substrates. *T. granifera* and *M. tuberculata* were negatively associated with distance from the spring head. This study is the first attempt to empirically determine snail population sizes and habitat associations for these two species of concern.

## **26 – DISCHARGE CONTROLS THE DISTRIBUTION OF RIVERINE DRAGONFLIES IN MAINE**

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Gathering detailed information on the distribution of sensitive species is the first step toward effective conservation management. Species distribution models are useful tools for understanding species' ecological requirements and biogeography, for predicting locations of unknown populations, for identifying areas for conservation or for potential translocations and reintroductions, and for forecasting the effects of environmental change. In North America, dragonflies and damselflies restricted to flowing waters represent a minority of species overall but the majority of our most imperiled species. Using distributional data from the Maine Damselfly and Dragonfly Survey and the National Hydrography Dataset, I have generated species-specific models that predict suitable river reaches (2 km long, on average) for 10 sensitive species using environmental parameters describing the climate, hydrology, topography, landuse, geology, and soils of specific river reaches and their watersheds. A principal component variable representing more than 99% of the variance in reach slope, mean annual flow, mean annual velocity, and drainage area was the most significant for 9 out of 10 modeled species. Some rivers away from known populations of these species were predicted to be suitable, suggesting the presence of undiscovered populations. With regard to the distributions of riverine dragonflies, factors such as landuse and climate appear to be secondary to the primary hydrologic characters of rivers. This modeling approach may permit us to forecast the effects of river management on distribution patterns of riverine organisms.

## **27 – THE SONG OF THE FROG: SOUTHERN HIGH PLAINS AMPHIBIAN COMMUNITY ECOLOGY DURING A DROUGHT**

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Anurans in the Southern High Plains are explosive breeders that depend on playa wetlands for breeding habitat after rain events. As their complex life cycle suggests, they require suitable biotic and abiotic conditions post-rainfall for successful breeding, egg survival, and tadpole development to ensure population persistence. Baseline data collection is necessary in Northeastern New Mexico to identify amphibian community composition and key habitat components impacting species presence, richness, and reproductive success. This region experienced a drought in 2011, receiving less than half of its average annual precipitation. As such, we were able to observe how amphibians use available habitat in the Southern High Plains in a drought year. We sampled twenty-two playa wetlands using call, visual encounter, pipe, and funnel-trap surveys to determine anuran species presence, richness, and reproduction. We recorded site-specific habitat variables as well as landscape-level factors such as road density, wetland density, and nearest wetland distance. Of the nine playa wetlands inundated in 2011, we detected anurans at five and evidence of reproduction at three wetlands. Species richness ranged from 0 to 4 species per playa. Five anuran species were detected including the spotted chorus frog (*Pseudacris clarkii*), a previously undocumented species in the state of New Mexico. We observed large fluctuations in pH (4.9 to 9.4) in wetlands used by anurans. With the threat of impending climate change increasing the frequency of extreme events such as drought, it is crucial we understand the impact this may have on community assemblages and associated available habitat.

## **28 – SOME LIKE IT HOT, BUT NOT OVENBIRDS (*SEIURUS AUROCAPILLA*): HOW ENVIRONMENTAL FACTORS INFLUENCES NEST SUCCESS IN A FOREST SONGBIRD**

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Nest success is a key fitness component for many songbirds. Both biotic and abiotic factors can influence songbird nest survival, but which factors have the strongest influence on nest survival can differ from species to species. At a study site in southeastern New York, nest predator abundance strongly drives nest success of the Veery (*Catharus fuscescens*), a ground-nesting songbird. It is likely that nest predator abundance also affects nest survival of heterospecific ground-nesters at this site, but this relationship has yet to be evaluated. We examined how nest predator abundance influences nest success of the Ovenbird (*Seiurus aurocapilla*), a heterospecific ground-nesting songbird, to compare to past nest survival studies on the Veery. Using Program MARK, we built competing models to determine how strongly nest predator abundance affects Ovenbird nest survival when evaluated with additional biotic and abiotic factors. We found that the number of growing degree days, nest initiation date, and regional Veery abundance best explain Ovenbird nest survival. Additionally, Ovenbird nest survival decreases with an increase in growing degree days. Nest predator abundance, precipitation, and regional Ovenbird abundance do not strongly influence Ovenbird nest survival. Thus, the strong relationship between nest predator abundance and nest success observed in Veeries does not seem to extend to Ovenbirds. Instead, our results suggest that Ovenbird nest success is sensitive to climatic changes. These sympatric ground-nesting songbirds differ in which factors best explain nest survival, therefore highlighting the importance of understanding the species-specific impact of environmental changes.

## **29 – EXAMINATION OF TRANSGENE SILENCING USING DICER LIKE KNOCKDOWNS IN *NICOTIANA TABACUM***

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A series of 35S::AtMyb90 *N. tabacum* transgenic lines were created, with several lines producing a purple phenotype due to plant-wide over-production of anthocyanin. One of the purple lines, Myb27F presents two distinct phenotypes that correlate with transgene dosage. Myb27F homozygotes appear to silence the 35S::AtMyb90 transgene, denoted by greening of the leaves in a pattern similar to systemic silencing. The Myb27F hemizygotes show no phenotypic signs of silencing. Analysis of mRNA levels by qRT-PCR reveals that AtMyb90 mRNA in the Myb27F homozygotes is dramatically reduced compared to that present in the Myb27F hemizygotes. It is also known that small RNA's for the coding region of the transgene are present only in the Myb27F homozygotes. To explore the mechanisms by which the 35S::AtMyb90 transgene in *N. tabacum* is silenced, Dicer-Like knockdowns (DCL2, DCL3, and DCL4) will be used. These knockdowns have been crossed with the Myb27F homozygous line, with a non-silencing AtMyb90 transgenic line Myb237G, and with wild type *N. tabacum* SR1.

## **30 – NEK2-TARGETED ASO OR siRNA PRETREATMENT ENHANCES ANTI-CANCER DRUG SENSITIVITY IN TRIPLE NEGATIVE BREAST CANCER CELLS**

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Although anticancer drugs such as paclitaxel and doxorubicin are commonly used to treat many types of solid tumors, their effectiveness is highly variable due to tumor cell resistance. Therefore, it is important to find mechanisms that can be targeted to increase the sensitivity of cancer cells to such chemotherapy agents. NIMA related kinase 2 (Nek2), a serine/threonine kinase, is emerging as an important oncogene because of its regulatory role in mammalian cell mitosis. Thus, regulation of the Nek2 expression levels may prove important as a target for cancer treatment. In this study, we investigated whether drug sensitivity was increased in the triple negative breast cancer cell lines MDA-MB-231 and MDA-MB-468 by using small interfering RNA (siRNA) and antisense oligonucleotides (ASOs) against Nek2. MDA-MB-231 and MDA-MB-468 breast cancer cells transfected with Nek2 siRNA or ASO were exposed to

various concentrations of paclitaxel and doxorubicin. Cell viability, cell cycle distribution, and apoptosis were evaluated. We observed that drug susceptibility in these transfected cells was significantly increased compared with either agent alone. Our FACS data showed siRNA and ASO-transfected cells induced apoptosis as expected due to Nek2's regulatory function in centrosome duplication. We observed that siRNA and ASO against Nek2 worked with paclitaxel and doxorubicin by progressing the cells to apoptosis. Our results suggest that Nek2 siRNA or ASO treatment in combination with these drugs greatly improve the sensitivity of triple negative cancer cells.

### **31 – ILLUMINATING THE FUNCTIONAL ROLE OF “NTAD” PROTEINS IN ADDICTION AND RELAPSE**

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As genome wide association studies (GWAS) continue to explore the role of genetics in craving, relapse and Substance Dependence Disorder (SDD), it is imperative to conduct functional studies on potential putative markers as they are identified. Over the past year, we have used the funding awarded by TTUAB to establish a reliable protocol for culturing primary hippocampal neurons from *Rattus norvegicus*, to verify localization patterns of neuropeptides expressed by the “NTAD gene cluster”. This cluster includes **NCAM1** (Neural Cell Adhesion Molecule), which is involved in signal transduction and neurogenesis. **TTC12** is thought to be involved in protein synthesis of Wnt signaling pathways and hippocampal neurogenesis. **ANKK1** is a signal transduction kinase (Fossella, Green et al. 2006) and **DRD2** codes for a G coupled protein Dopamine type 2-receptor (Yang, Kranzler et al. 2007). The genes and expressed proteins that comprise this cluster are highly conserved in rats and humans and are thought to co-regulate risk for addiction, and possibly, relapse via the mesocorticolimbic dopaminergic pathway. We are testing the hypotheses that haplotype variation in the NTAD gene cluster may serve as an important marker for SDD risk and that functional analysis of the NTAD proteins may be elucidated through chemical induction. Baseline localization studies have resulted in encouraging proof-of-concept data. Future directions include real time functional analyses of the NTAD proteins and documentation of localization and co-localization patterns *in situ*.

### **32 – DEVELOPING A MONITORING PLAN FOR BATS OF THE GREAT PLAINS OF TEXAS**

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Successful conservation efforts are supported by a practical, systematic, and adaptive monitoring protocol for the species of concern. Climate change and land conversion in Texas will affect the biological communities that depend on the dynamic processes that occur in the Great Plains. Bats are a diverse taxon with fourteen reported species in the panhandle of Texas; however, there has never been a systematic survey of the taxon's presence in the area. Bats are important bioindicators for ecosystem health and control insect pest populations. The taxon faces many critical issues in Texas such as urbanization, expansion of wind energy farms, climate change, and instability in critical resources such as playas. In order to address these conservation issues, bat populations and their use of habitat types in Texas need to be monitored. We propose initiating a monitoring protocol for bats utilizing stationary monitoring points along transects. Transects and stationary points will be selected using a balanced spatially stratified design known as GRTS. Data collected from these efforts can be used as an index of abundance over time and identify the most frequently utilized habitat types for recorded bat species. Our proposed monitoring program will be a foundational step in understanding bat ecology, diversity, and conservation in the Great Plains of Texas.



### **33 – OAK WATER USE STRATEGIES IN THE SKY ISLANDS OF THE SOUTHWESTERN UNITED STATES**

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Woody plants living in the Sky Island mountain ranges of the southwest United States must have functional traits that allow survival in this water limited environment. In arid and semi-arid systems, differences in water-use strategies are recognized as important drivers of niche differentiation. These regions are expected to see longer, more severe droughts that will require plants to possess the needed traits to tolerate or avoid the new climate change induced conditions. Measuring vulnerability to water stress induced cavitation has emerged as one of the most powerful ways in which to assess drought tolerance and determine trade-offs between safety and efficacy of water movement. This project will involve three types of data; trait data collected on individual plants, measurements and predictions of environmental conditions and micro climate, and plot based community composition data. Detailed xylem and leaf functional trait measurements will be collected on eight oak species present on The Nature Conservancy's Davis Mountains Preserve Texas, and the Appleton-Whittell Research Ranch, Arizona, which bracket the northern Chihuahuan desert region. The Davis Mountains, Texas, will be used as a focal area in which to measure and model temperature and soil moisture variation across topography and through time. Together, these data will allow for the characterization of species' vulnerability to drought and freezing and predict potential distribution shifts under a warming climate.

### **34 – EXAMINATION OF POLYCYCLIC AROMATIC HYDROCARBONS IN AN URBAN STORMWATER SYSTEM AND THEIR TERATOGENIC EFFECTS ON ODONATA**

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Polycyclic aromatic hydrocarbons (PAHs) are environmental contaminants that originate from anthropogenic sources and are constituents of runoff in urban environments. In order to examine the existence and concentration of PAHs in our local environment, we propose to examine the South Central Drainage Project (SCDP) of Lubbock, Texas. This series of modified and linked playas serve as Lubbock's primary storm-water retention and removal system. Twelve 1-liter water samples from each of four playas (McAllister, Elmore, Andrews, and Clapp) will be collected and analyzed by gas chromatography and mass spectrometry for PAH composition and concentration utilizing the Modified EPA Method 8270. Field-testing of water quality measurements, including temperature, dissolved oxygen (DO), pH, and conductivity, will be recorded to assess overall environmental conditions. We hypothesize that PAH concentration will follow the SCDP hydrological gradient of west to east, with highest concentrations thus occurring in Clapp Park (easternmost site). PAHs have been identified as possessing teratogenic properties. In order to examine if these effects are manifested in organisms within the SCDP, we propose collecting eggs from twenty female damselflies (*Enallagma civile*) from each of the four playas. The eggs will then be analyzed for differences in amino acid and elemental composition. We hypothesize that differences in egg compositions will correspond to the PAH gradient described above.

### **35 – SWARMING AND MATING BEHAVIOR OF FROG - BITING MIDGES (DIPTERA: CORETHRELLIDAE)**

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Swarming is the most common aggregation behavior shown by lower flies (Nematocera) when mating. Swarming is observed in the wild as well as in many laboratory colonies of mosquitoes. Corethrellidae, a monogeneric family that includes about 100 species of frog-biting midges (*Corethrella* spp), is the sister taxa to mosquitoes (Culicidae) and phantom midges (Chaoboridae). The mating behavior of these midges, however, is unknown to date. This study will investigate the mating and swarming behavior of laboratory reared frog-biting midges (*Corethrella appendiculata*). We will determine swarm formation and characteristics, pairing and copulation behaviors of *C. appendiculata* as well as mating signals

produced within the swarm. We will also compare the insemination rate of female midges among swarms of different sizes to determine the role of increased fertility as an advantage of swarming. Male and female midges (100 each) will be introduced to the observation cage (insect rearing cages). All behaviors will be video recorded for one hour at the beginning of the night (18.00-19.00PM) using infrared cameras to study pre- and post-mating behaviors in detail. A particle velocity microphone will be used to record the acoustic signals produced within the swarms. Overall our study will examine the role of swarm formation and the use of acoustic communication during mating in frog-biting midges, results that in the light of current knowledge about mosquito's mating behavior will provide insights about the evolution of such reproductive strategies.

### **36 – INCREASING THE FINE SCALE RESOLUTION OF DETECTING AMERICA AND MORELET'S CROCODILE INTROGRESSIVE HYBRIDIZATION USING A LARGE NUMBER ON MIRCOSATELLITES**

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Introgressive hybridization is considered extremely uncommon and difficult to prove in animal speciation. However, hybridization is considered to be a very significant aspect in the conservation of biodiversity, when it comes to conserving natural populations of charismatic fauna, such as crocodylians. Molecular genetics are tools in testing for ancient and current hybridization events in several taxa, including crocodylians. Our study focuses on testing 40 microsatellite loci isolated and characterized from the saltwater crocodile (*Crocodylus porosus*), for cross-species amplification and polymorphism in American (*C. acutus*) and Morelet's (*C. moreletii*) crocodiles collected throughout Mexico. The utilization of a large set of multi-locus markers, will not only help to understand the evolutionary history of Neotropical Crocodylians, but to also enhance our knowledge of current population dynamics that may ultimately lead to the development of better management and conservation programs. Our preliminary results have found consistent cross-species amplification for 12 out of the 40 markers in both pure and hybrid species and indicate differing degrees of genetic variation.

### **37 – EFFECTIVENESS OF SCENT STATIONS, GAME CAMERAS, AND SCENT TYPES FOR ASSESSING MAMMALIAN PRESENCE AND ABUNDANCE IN AN URBAN ENVIRONMENT**

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Scent stations and game cameras are an excellent method of observing wildlife and estimating populations with minimal disturbance. We established scent stations with game cameras at 4 sites in Plainview, Hale Co., Texas. Each site was monitored for 3 weeks using a different scent type (coyote, fox, raccoon) each week to determine mammalian species present and effectiveness of scent types. Sites included 2 alleys in neighborhoods and 2 near the edge of urban extent. Overall, fox urine yielded the most photocaptures (mean=22.75 captures/site), followed by coyote attractant (mean=16.75 captures/site) and raccoon urine (mean=16 captures/site). Species captured included: coyote (*Canis latrans*, n=2, 1 site), gray fox (*Urocyon cinereoargenteus*, n=4, 1 site), domestic cats (*Felis catus*, n=193, 4 sites), domestic dogs (*Canis lupus familiaris*, n=20, 4 sites), eastern fox squirrel (*Sciurus niger*, n=5, 2 sites), and eastern cottontail (*Silvilagus floridanus*, n=48, 3 sites). Because cats are identifiable by pelage, we were able to estimate the numbers of cats at each site. Cat numbers were highest at alley sites (Alley Site 1: N=4 individuals, 64 photos; Alley Site 2: N=5 individuals, 116 photos) compared to sites on the outer edges of town (Urban Edge 1: N=1 individual, 2 photos; Urban Edge 2: N=2 individuals, 11 photos). Our results suggest that scent stations and wildlife cameras can be useful for determining patterns of abundance of urban wildlife and feral or domestic dogs and cats.

### **38 – EXPLORATORY BEHAVIOR AND FORAGING SUCCESS IN A NOVEL ENVIRONMENT: THE CURIOUS CASE OF THE CANE TOAD (*RHINELLA MARINA*)**

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An individual's ability to modify its behavior as a result of experience is a key component of successful survival in changing environments. The cane toad, *Rhinella marina*, is known for its invasive capabilities and successful colonization of new environments, but anurans are not generally thought to be good learners. This study examines how the exploratory behavior of the cane toad changes as a result of experience in a previously novel environment. We predicted that toads would modify their behavior based on information gained during previous trials to better find and consume food. We tested 19 wild-caught cane toads from their native range in an exploratory arena in two treatments, with or without food present. After initial training, toads were tested to determine if movement and behavioral strategies changed over time. Toads in both treatment groups modified their behavior as a result of experience. Total path length, time spent in the margin of the arena, and number of escape attempts significantly decreased in both groups over trials. Toads exposed to food in the arena modified their behavior by visiting a lower total number of bowls over time, yet visited a greater number of unique bowls and ate more mealworms per trial. Our results show that cane toad behavior is modulated by experience with a novel environment and the presence of food. This study ultimately emphasizes the role of learning in foraging in cane toads, a characteristic that may have facilitated their success as invaders.

### **39 – EFFECTS OF HABITAT ISOLATION ON SPECIES TURNOVER AND COMMUNITY NESTEDNESS IN A DESERT RIVER SYSTEM**

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Habitat connectivity is a vital and dynamic element for persistence and maintenance of fish communities in desert river systems. The Rio Grande and its tributaries in the Trans-Pecos region of Texas have been impacted by a variety of anthropogenic activities including dewatering and the introduction of non-native species. Although the tributary systems are naturally fragmented and were historically populated with spring-adapted native fish species, they now have to contend with introduced nonnatives such as the green sunfish and plains killifish. It is imperative to understand how habitat connectivity and non-native species impact fish assemblages in the Rio Grande and its spring-fed tributary habitats. We examined the colonization/extinction dynamics and nested subset patterns of fish assemblages in the Rio Grande and its spring-fed tributary habitats, and the relationships with habitat isolation and environmental variability. Our results indicated that certain tolerant fish taxa permanently persisted in the isolated refugium habitats with high environmental fluctuation. Fish assemblages had significant nested subset patterns along the habitat isolation gradient. However, certain nonnative fish taxa were idiosyncratic, reducing the strength of the nested subset pattern. Deviation from the nested subset pattern may be attributed to randomness associated with artificial introduction of non-native fish taxa or difference in response of native and nonnative species to environmental variability. We suggest that reduction of the habitat connectivity may cause increased local extinction rates of certain native fish taxa and accelerate the dominance of tolerant species or nonnative fish taxa, leading to altered fish assemblages in the region.

### **40 – SIZE MATTERS: USING ALLOMETRY TO CONTROL INVASIVE AUSTRALIAN CANE TOADS (*BUFO MARINUS*)**

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Considered one of the world's 100 most invasive species, the cane toad (*Bufo marinus*) has proven to be highly adaptable and difficult to extirpate. In Australia, invasive cane toads are particularly problematic with quantified negative effects on many native species. Previous modeling efforts have shown that

removal of adults is likely the most effective means of control, however, these models have neglected to investigate the potential effects of newly proposed control methods that will indirectly affect survival by altering cane toad body size and growth rates (i.e., tadpole alarm chemicals and meat ants). Several life history parameters of the cane toad (e.g., fecundity and metamorph survival) are allometric and thus vary with changes in body size. A stage-based population model with density dependence at the tadpole stage and individual growth at terrestrial stages was constructed in order to examine the effect of tadpole alarm chemicals, predatory meat ants, and the removal of adults on mean adult population size. The model produced estimates of 700-1300 adults per 100 m, which is consistent with observed population estimates from Australia. Both meat ants and tadpole alarm chemicals yielded greater reductions in average adult population sizes than manual removal of adults. In addition, simultaneous application of tadpole alarm chemicals and meat ants resulted in the smallest estimated adult densities and, on several runs, population extinction. These findings contrast with those of previous studies, reflecting the importance of incorporating body size into modeling efforts of species whose life history parameters vary allometrically.

#### **41 – Vfr DIRECTLY REGULATES THE EXPRESSION OF THE *P.AERUGINOSA* OPERON PA2782-PA2783**

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*Pseudomonas aeruginosa* is a gram-negative opportunistic pathogen that causes serious infections in immunocompromised hosts, including cystic fibrosis patients, severely burned patients, and cancer patients undergoing chemotherapy. The production of *P. aeruginosa* virulence factors is controlled by several global regulators including the virulence factor regulator Vfr. Vfr is a homologue of the *Escherichia coli* catabolite repressor protein CRP, which requires cAMP for its activation. Similarly, Vfr requires cAMP for activation, and both are essential components of a complex global regulatory system that controls the production of multiple virulence factors in the *P. aeruginosa* strain PAO1. We previously identified *P. aeruginosa* PA2783 as a gene whose expression is enhanced by Vfr. Examination of the genomic sequence of PAO1 revealed the presence of a second gene, PA2782, 5' of PA2783. Computer analyses suggested that PA2782 and PA2783 constitute an operon. Transcriptional analysis using real-time qPCR and a PAO1 *vfr* deletion mutant revealed that, at early stages of growth, the expression of both genes is significantly lower in the absence of Vfr. Electrophoretic mobility shift assays were used to determine if Vfr binds to the PA2782 upstream region, the PA2782-PA2783 intergenic region, or both. In the presence of cAMP, r-Vfr produced two gel shift bands when incubated with the PA2782 upstream region. Both bands were eliminated upon the addition of excess unlabelled PA2782 upstream region, indicating the specificity of r-Vfr binding. These results suggest that Vfr directly binds to the upstream region on the PA2782-PA2783 operon and enhances its expression.

#### **42 – SOIL MICROBIAL COMMUNITY FUNCTION AND REDUCED DAILY TEMPERATURE RANGE: IS THERE ANY LINK?**

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Daily minimum temperatures are predicted to increase at a significantly higher rate than daily maximum temperatures resulting in a reduced daily temperature range (DTR). The effect of reduced DTR on microbial community dynamics is poorly understood despite the vital role of soil microorganisms in ecosystem functioning. A study to address these concerns was initiated in the Chihuahuan Desert at Big Bend NP, Texas in 2006. We reduced DTR<sub>soil</sub> using polyethylene shade cloth suspended above the soil surface such that it allowed normal precipitation infiltration and airflow. Soil fungal and bacterial community function was evaluated on the basis of substrate utilization of carbon and nitrogen, and enzyme activities of important carbon and nitrogen cycling enzymes. DTR<sub>soil</sub> was reduced by 2-6°C in the shaded plots with increased daily minimum temperature and lower daily maximum temperature. The decrease in DTR<sub>soil</sub> in the shaded plots increased the functional diversity of fungi on carbon sources by 46-65% (due to increased utilization of carbohydrates, amino acids, amides and polymers), and nitrogen

sources by 9-36%. Carbon substrate utilization by soil bacteria was higher in the shaded plots only with respect to polymer utilization. Likewise, shaded plots had 31% and 32% higher  $\beta$ -glucosidase and  $\beta$ -glucosaminidase activity, respectively. These results suggest that reduction in  $DTR_{soil}$  increases the functional diversity of soil fungi to a greater extent than soil bacteria. If  $DTR_{soil}$  continues decreasing in these systems as predicted, microbial communities in arid ecosystems may shift towards fungal dominance.

#### **43 – TENABLE COSTS OF BAYOU VIRUS INFECTION IN *ORYZOMYS PALUSTRIS* (MARSH RICE RAT)**

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Although current dogma holds that rodent hosts infected with hantaviruses suffer no negative consequences, most studies to date have examined only adult males. A mounting body of evidence, however, suggests that females and other age classes should be examined. We found evidence that there are costs to infection with the Bayou strain in wild juvenile, subadult, and female adult marsh rice rats (*Oryzomys palustris* (Harlan, 1837)) in terms of decreased weight, increased trap myopathy, decreased residency times, and defending increased home-range sizes by seropositive relative to seronegative conspecifics. These discoveries impel a re-examination of host-hantavirus ecology and the reigning paradigm of hantavirus infection benignity in host rodents.

#### **44 – REGULATION OF *LEISHMANIA* SPHINGOLIPID METABOLISM VIA SPHINGOSINE KINASE**

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*Leishmania*, the causative agent of the disease leishmaniasis, is a protozoan parasite transmitted by the sandfly that affects over 12 million people in 88 countries. Here, we focus on the role of Sphingosine Kinase (SK) in *Leishmania* pathogenicity. SKs phosphorylate sphingoid bases, sphingosine or dihydrosphingosine, to form sphingosine-1-phosphate (S-1-P) or dihydrosphingosine-1-phosphate (DHS-1-P). S-1-P and DHS-1-P are potent signaling molecules in mammals, implicated in inflammation and tumorigenesis; however, the function of SKs in protozoa is unknown. We identified a single *Leishmanisa* SK, *SKa*, which shares ~30% homology with human *SPHK1/SPHK2* and yeast *LCB4/LCB5*. Loss of *SKa* causes fatal defects during both promastigote (sandfly) and amastigote (mammalian) stages. As promastigotes, *SKa* is needed both as a means of producing ethanolamine (needed for downstream phospholipid synthesis) and detoxifying the intermediate sphingoid bases made in the process. Accumulation of sphingoid bases in *ska*<sup>-</sup> mutants results in growth arrest at late log phase, and their subsequent death prevents differentiation into infective metacyclics. Overexpression of *SKa* or a combination treatment of myriocin (which inhibits upstream sphingoid base synthesis) and ethanolamine rescues this defect. As amastigotes, *ska*<sup>-</sup> parasites infect macrophages normally but *ska*<sup>-</sup> and *ska*<sup>-/+SKA</sup> show no pathology and low parasite burden in mice. Sensitivity to stress factors such as acidic pH, elevated temperature, and oxidants may explain the *ska*<sup>-</sup> defect. Future studies aim to better understand this new role of sphingolipid metabolism in stress response, identify the target of *SKa*, characterize other leishmanial SKs, and evaluate the efficacy of *SKa* as a drug target.

#### **45 – ANALYSIS OF *BATRACHOCHYTRIUM DENDROBATIDIS* GENE EXPRESSION IN PLANKTONIC VERSUS BIOFILM LIFE CYCLE STAGES**

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*Batrachochytrium dendrobatidis* (*Bd*) is a chytrid fungus that has been recognized as the most likely cause for the massive amphibian declines worldwide. Previous studies in our lab have shown the ability of *Bd* to form a biofilm. Genes Zap1, ADH3, CS1, CS2, and Cps1p, which are known to play roles in biofilm production in fungi and bacteria, were analyzed. Expression profiles of these genes were compared between biofilm and planktonic cells, through reverse transcriptase and quantitative real-time polymerase chain reactions (RT-PCR & qPCR). Analyses were carried out using the 5.8S rRNA as an internal standard. A phenotypic microarray (FUNGILOG) was also used to compare carbon utilization differences between biofilm and planktonic cells. Our results indicate that Cps1p, ADH3, Zap1, CS1 and CS2 genes are highly expressed in the biofilm stage being up-regulated 12-fold, 10-fold, 5-fold and 3-fold respectively. Differential expression of Cps1p and ADH3 were statistically significant (p value = 0.0104 and 0.0016 respectively). The carbon utilization studies indicate that there were no significant differences in carbon utilization between the two life stages of the fungus. These studies will provide good insight about the survival of *Bd* in the environment without its animal host.

#### **46 – ENVIRONMENTAL FATE OF TEBUTHIURON: DATA GAPS RELATED TO ITS USE FOR BRUSH MANAGEMENT IN DUNES SAGEBRUSH LIZARD AND LESSER PRAIRIE CHICKEN HABITAT**

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The dunes sagebrush lizard *Sceloporus arenicolus* is an endemic species occurring in the Permian Basin area of the western United States including the vicinity of oil and gas wells in West Texas and southeastern New Mexico. The lesser prairie chicken *Tympanuchus pallidicinctus* occurs in West Texas and eastern New Mexico. Both species are candidates for listing on the endangered list by the United States Fish and Wildlife Service. Should this occur, there will be consequent effects on oil production in the region with economic impacts on the oil industry in the United States. However, the population dynamics of both species in this region is still poorly understood. A clear understanding of the immediate factors affecting these populations is critical. Suspected stressors of both lizard and bird in the region include oil and gas development, roads disrupting habitat patches, seismic exploration, shinnery oak removal from the habitat, vehicular movement, agricultural uses, unsuitable grazing management practices, prolonged drought and the herbicide tebuthiuron. The aim of this project is to gain insight into the effects of tebuthiuron as a stressor on the populations of these species in their habitat. We will assess the fate of tebuthiuron in the environment in order to fill in the gaps related to its potential use for brush management in dunes sagebrush lizard and lesser prairie chicken habitat. This research will contribute to the pool of information concerning stressors impacting in isolation or in interaction with other stressors on both species.

#### **47 – MINIMALLY INVASIVE TECHNIQUE FOR DETERMINATION OF METALS PRESENT IN TISSUES OF THE GREEN SEA TURTLE *CHELONIA MYDAS***

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Metals from anthropogenic sources have entered marine environments and accumulated in various organisms, including sea turtles. All seven sea turtle species are classified as threatened or endangered, thus obtaining internal tissues for determination of metal concentrations is difficult. Therefore, a minimally invasive, non-lethal sampling technique is needed for assessment of metal exposure among these protected species. In this study, claw clippings from front flippers of *Chelonia mydas* (green sea turtle) were evaluated for their utility as indicator tissues for metals in internal tissues of sea turtles. The relationship between metal concentrations in tissues and turtle size was also examined using standard carapace length (SCL), a growth parameter. Several significant correlations were observed between internal tissue and claw concentrations of arsenic, mercury, nickel, and zinc ( $p < 0.05$ ). Growth-dependent variations in concentrations of cobalt, lead, and manganese were demonstrated by correlations between SCL and internal tissue concentrations ( $p < 0.05$ ). In this study, it was found that claws can serve as a minimally invasive and non-lethal indicator tissue for determination of arsenic, mercury, nickel, and zinc in internal tissues of *C. mydas*.

#### **48 – CO-EXPOSURE TO XENOESTROGENS AND BENZO(A)PYRENE ALTERS DNA DAMAGE RESPONSE**

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Many ubiquitous environmental contaminants have been identified as endocrine disrupting compounds (EDC) in recent scientific literature. However, much controversy still exists regarding their potential effects on ecological and human health, and mechanistic studies of various forms of EDCs remain under investigation at the cellular and genetic level. Numerous xenoestrogens have been connected to adverse effects in humans and wildlife at low concentrations, and studies have also linked them to potential carcinogenesis. One potential mechanism underlying adverse effects of xenoestrogens is DNA damage and aberrant DNA repair processes. Nucleotide excision repair (NER) is an essential DNA repair mechanism required for the removal of bulky DNA adducts. To investigate the effects of known xenoestrogens on NER, we exposed killifish (*Fundulus heteroclitus*) to varying concentrations of arsenic and ethinylestradiol (EE<sub>2</sub>), a metalloid that exhibits estrogen-like effects and a synthetic pharmaceutical estrogen, respectively. After 48 hours fish were intraperitoneally injected with benzo(a)pyrene (BaP), a known environmental mutagen and carcinogen. mRNA abundance of genes involved in NER, as well as the CYP1A family of genes were examined due to their known induction by EDCs and toxicant exposure. Xenoestrogens alone hindered transcriptional response to the NER damage recognition gene, XPA, which is consistent with previous literature. BaP alone induced a dose-response in mRNA abundance of CYP1A1 and XPA, while the addition of EE<sub>2</sub> and arsenic further induced XPA up-regulation after 12 hours of exposure. Our data yield insight into combinations of environmental mutagens and xenoestrogen contaminants commonly found in aquatic systems.

#### **49 – SUBLETHAL EFFECTS OF TRICLOSAN ON ATLANTIC CROAKER (*MICROPOGONIAS UNDLUATUS*)**

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Triclosan (2,4,4'-trichloro-2-hydroxydiphenyl ether) is an antimicrobial component of many personal care products including deodorants, toothpastes, and hand soaps. Since most triclosan products are disposed of via residential drains, triclosan passes through wastewater treatment plants and into watersheds. Triclosan is highly hydrophobic and accumulates in a variety of species including fish, frogs, rodents, bottlenose dolphins, and humans. At high doses, triclosan has a high acute toxicity for many aquatic organisms. At lower doses, it acts as an endocrine disrupter, negatively impacting thyroid hormone homeostasis as well as decreasing predator avoidance behaviors. This study investigated the sublethal effects of triclosan on Atlantic croaker, an estuarine fish. Juvenile Atlantic croaker were housed individually in 76 l tanks and were fed either a standard food pellet or one impregnated with 200 ppm triclosan for 14 days. Both prior to and immediately following the exposure period, fish were subjected to a suite of reflex tests called the Reflex Action Mortality Predictor (RAMP) which indicate normal physiological function. Fish were also tested on their ability to avoid a simulated predator attack. Triclosan-exposed fish displayed lower RAMP scores indicating higher impairment and a higher risk of mortality. Specifically, triclosan-exposed fish showed impairment of the dorsal spine reflex which has been associated with dominance behavior and aggression in other teleosts. Triclosan-exposed fish also showed a decreased ability to avoid predators. These effects could have far-reaching consequences for both croaker populations and populations of croaker predators like bottlenose dolphins that accumulate triclosan through ingestion of contaminated prey.

#### **50 – AN EXAMINATION OF THE EFFECTS OF METHYL TRICLOSAN ON EARLY EMBRYONIC DEVELOPMENT IN THE SOUTH AFRICAN CLAWED FROG (*XENOPUS LAEVIS*)**

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Triclosan (5-chloro-2-(2,4-dichlorophenoxy)phenol) is a bactericide used in many personal care products such as liquid detergents, liquid hand soaps, deodorants, cosmetics, creams, lotions, mouthwash, and toothpaste. Triclosan also can be added to fabrics, plastics, carpets, plastic kitchenware, and toys (Leiker, 2009). Methyltriclosan can be formed from triclosan via biological methylation at an unknown interval during waste water treatment. Methyltriclosan is more abundant in the environment, more lipophilic than triclosan, and has greater potential to accumulate in fatty tissues (Leiker, 2009). The global decline of amphibian populations has raised awareness surrounding the possible effects of poor water quality. Triclosan and methyltriclosan have been reported in surface waters at concentrations of 0.40 µg/L and 0.04 µg/L, respectively (Leiker, 2009). Since metamorphosis and reproductive development (Shi, 2001) in amphibians is highly regulated by thyroid hormone (TH), and the structure of triclosan is similar to that of TH (Veldhoen, 2006), raises the possibility that triclosan and methyltriclosan may act on TH receptors to alter metamorphosis and reproductive development. Standard FETAX protocols were followed using the South African Clawed Frog (*Xenopus laevis*) embryos. The results show that exposure to TH, specifically T<sub>3</sub>, and methyltriclosan increases somatic size, snout vent size and skull size in a concentration-dependent manner relative to vehicle controls. In upcoming analyses, RNA will be extracted from methyltriclosan-treated animals to examine whether this contaminant increases the expression of T<sub>3</sub> responsive genes in the embryo. Collectively, these data will be the first to report on the responsiveness of vertebrate embryos to methyltriclosan exposure.



## **51 – CONSERVING CAVE BATS IN THE PHILIPPINES: ASSESSING THE IMPACT OF CAVE DISTURBANCE ON BAT COMMUNITIES**

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Cave-dependent bats serve essential ecological and economic roles (pollination, insect control) in the Philippines, yet human disturbances at caves threaten their persistence. On Bohol Island in the central Philippines human pressures on cave bats are occurring at multiple scales: i) loss of foraging sites to widespread logging operations; and ii) localized disturbances from residents (hunting, cave tourism, guano mining) causing bats to abandon caves. Such threats jeopardize the viability of cave-dependent bats. No studies to date have quantified the impact of human disturbances on cave-dependent bats in the Philippines though this is needed to devise effective conservation strategies as outlined in the Philippine National Cave Act. My study aims to compare cave-dependent bat communities among caves experiencing differing levels of human disturbance to: i) assess the status of cave bats in an increasingly human-dominated landscape to identify priority caves; and ii) pinpoint threats that have the greatest impact on cave bats. Specifically, this study will quantify disturbance levels at 60 caves using a modified karst disturbance index, and compare with species diversity and composition of bat communities documented over 2 nights. Preliminary data from 14 caves surveyed July - December 2011 indicate that caves subject to high levels of human disturbance, specifically mining and tourism operations, had lower species richness and fewer endemic species. This is likely due to the degree of cave modification. Final results will be used to evaluate the significance of individual caves for maintaining viable populations of cave-dependent bats, a priority under the National Cave Act.

## **52 – AN AMPHIBIAN’S DILEMMA: WETLAND SITE SELECTION AND COMMUNITY ASSEMBLAGES IN AN URBANIZED SETTING**

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Landscape alterations caused by urbanization have played a role in the alarming declines of amphibian populations. Hence, improving our understanding of urban amphibian ecology is critical to their long-term conservation. Our study focuses on suitability of urban wetlands for amphibian use, and gathering baseline data on amphibian presence, species richness, and species-specific preferences based on site-specific and landscape-scale variables in Lubbock, located in northwest Texas. Amphibian ecology within urban centers of the Southern High Plains remains poorly explored; this project is the first of its kind in the region. Ephemeral wetlands characteristic of this landscape have been extensively modified for storm water drainage, agriculture, and construction of roads, buildings, and neighborhoods. A semi-arid climate with frequent droughts, together with urbanization, could have an adverse effect on resident amphibians. In 2011, we sampled 23 lakes for amphibian presence using a combination of audio, visual, and larval surveys. We detected amphibians at seven lakes, with *Anaxyrus speciosus* and *Pseudacris clarkii* being most predominant. We found significant negative effects of road density on amphibian species presence and richness ( $p \leq 0.05$ ). We also detected significant negative effects of pH on amphibian species richness ( $p \leq 0.05$ ). Negative effects of these two factors were also observed specifically on *P. clarkii* presence ( $p \leq 0.05$ ). We will complete a second season of sampling in 2012. This data is critical for prioritizing lakes in amphibian conservation strategies and to indirectly monitor ecosystem function in urban wetlands.

### **53 – LANDSCAPE-LEVEL ASSOCIATIONS BETWEEN WATER QUALITY AND GOLDEN ALGA PRESENCE, ABUNDANCE, AND TOXICITY IN RESERVOIRS OF WEST TEXAS**

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Toxic blooms of golden alga (GA, *Prymnesium parvum*) have caused massive fish-kills in Texas surface waters. Impacts to fish populations have been relatively severe in reservoirs of the upper Colorado River (UCR) basin of west Texas. Although GA blooms elsewhere occur primarily in winter, blooms in the UCR often last for several months and can extend into summer. Water quality conditions in UCR reservoirs may therefore be relatively suitable for GA growth. To test this hypothesis, we quantified GA cell density, ichthyotoxicity, and water quality conditions in three impacted reservoirs from the UCR or its tributaries; two non-impacted (reference) reservoirs from the Concho River; and three sites at the confluence of the UCR and Concho River. Sampling occurred monthly from January 2010 to July 2011. Principal components analysis showed that impacted sites clearly separated from reference sites by salinity and hardness. When analyzed with multiple regression, however, salinity and hardness did not explain variability in GA cell density within impacted reservoirs. Nutrients were also quantified from December 2010 to July 2011. GA cell density in impacted reservoirs seemed to associate with dissolved inorganic nitrogen (DIN) and dissolved inorganic phosphorus (DIP) concentrations. GA cell densities were highest at DIN:DIP values less than ~17, and a rise in DIN:DIP during early summer corresponded to a decline in GA cell density. Overall, these findings suggest that management of reservoir hardness and/or salinity could reduce favorable conditions for GA growth and also highlight differences in nutrient dynamics between GA-impacted and non-impacted reservoirs.

### **54 – COMMUNITY RESPONSE TO USE OF PRESCRIBED GRAZING AND TEBUTHIURON HERBICIDE FOR RESTORATION OF SAND SHINNERY OAK (*QUERCUS HAVARDII*) COMMUNITIES**

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The shinnery-oak (*Quercus havardii*) grasslands are important relic ecosystems, home to a host of endangered species. With the introduction of row-crop agriculture, fire suppression, oil and gas exploration, and unmanaged, continuous livestock grazing replacing historical seasonal grazing by bison (*Bison bison*), vegetative composition has changed the proportion of shrubs across much of the region. Although sand shinnery-oak is not considered an invasive plant, it is a highly effective water gatherer and has the potential to out compete native grasses in unmanaged, continuous grazing systems. Researchers have looked at the effects of grazing and stocking rates in shinnery-oak communities; however, no research has been conducted on how the grazing and tebuthiuron herbicide interact together to restore the community. This ten-year data set from eastern New Mexico compares plant composition, structure, and production as well as mammal, herptile, and invertebrate variables. The treatments were arranged in four combinations: herbicide with grazing, herbicide without grazing, no herbicide with grazing and a control of no herbicide without grazing. Our results show that at relatively low levels of tebuthiuron (0.60 kg/ha) and subsequent moderate grazing system, sand shinnery oak can be reduced without reapplying tebuthiuron because grasses can remain competitive in the system. Also, treated and grazed areas came closest to historical standards and had an increase in forbs and invertebrates. Striking a balance between shrub control and grazing is essential for maintaining prairie habitat for wildlife and grass for cattle production.

## **55 – MULTIPLE FACTORS INFLUENCE GENE FLOW IN THE GREAT PLAINS: THE SWIFT FOX AS A CASE STUDY**

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The Great Plains is a vast ecosystem characterized by habitat fragmentation from natural and anthropogenic sources. Understanding habitat fragmentation's influence on grassland connectivity is critical for long-term management. The swift fox (*Vulpes velox*) is a useful model system for studying habitat fragmentation in the Great Plains as its current distribution is closely associated with remnant grassland habitats. Previous research indicates genetic structure exists across the species' distribution in the United States, in apparent association with natural and anthropogenic sources of habitat fragmentation. We chose 2 study areas ("CO" and "WY") impacted by similar sources of habitat fragmentation, but at different intensities. We constructed genotypes for swift fox samples (N = 123 for WY and N = 367 for CO) and analyzed genetic structure in each area using STRUCTURE. We interpolated continuous genetic surfaces using Inverse Distance Weighting and identified a suite of abiotic, biotic, topographic, and anthropogenic variables which may influence connectivity. Next, we tested variable importance using Random Forests in R. Finally, we produced functional connectivity maps for each area. Our models exhibit high explanatory power ( $R^2$  range = 64% to 95%). Our results indicate connectivity varies across the Great Plains and is influenced by different factors regionally. We found that anthropogenic activities disrupt gene flow at fine spatial scales. Climate variables were highly ranked, providing important implications for landscape connectivity in future climate change scenarios. Finally, we present a powerful analytical method for assessing landscape connectivity which can be applied to many species and ecosystems.

## **56 – ASSESSING REGIONAL DIFFERENCES IN PREDATION OF ENDANGERED SPECIES: IMPLICATIONS FROM TEXAS POPULATIONS OF THE ENDANGERED STAR CACTUS *ASTROPHYTUM ASTERIAS* (ZUCCARINI) LEMAIRE**

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Understanding threats to endangered species is one of the most critical components of implementing a successful recovery plan. For the endangered star cactus *Astrophytum asterias* (Zuccarini) Lemaire, both mammalian and insect herbivory have been documented as a major threats to populations in Mexico. Herein, we focus on populations of *A. asterias* in Texas and how mortality threats differ from populations found in Mexico. Our study supports insect and mammalian herbivory as a major threat to *A. asterias* in Texas, with reductions in population sizes ranging between 16- 54%. However, our study highlights that regional differences such as those seen in local herbivore guilds can lead to differential patterns of mortality even in a range-restricted species such as *A. asterias*. We also found variation in mortality at the local scale, with herbivore-induced mortality differing significantly among our 5 study sites. We found no relationship between local weather conditions and mortality rates. Mortality differed among size classes, with individuals ranging in size from 3-6 cm facing a greater risk of mortality. Our results highlight the need to assess threats at both local and regional scales for effective implementation and development of endangered species recovery plans.

## **57 – ENHANCING COTTON FIBER ELONGATION AND CELLULOSE SYNTHESIS BY MANIPULATING FRUCTOKINASE ACTIVITY.**

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The length and strength of the cotton “fiber” depends upon its cellulose synthesis. Cellulose synthesis requires UDP-glucose that is primarily produced from sucrose by sucrose synthase (SuSy). The other product of the SuSy-catalyzed reaction is fructose, which can inhibit SuSy. Our hypothesis is that enhancing the removal of fructose via phosphorylation by fructokinase (FRK) would reduce SuSy inhibition, improve cellulose synthesis, and improve fiber length and strength. We developed transgenic cotton plants transformed with a tomato fructokinase (LeFRK1). Three of six transgenic lines had high and three moderate to low expression of LeFRK1 in leaves and in developing fibers. Increase FRK activity was obtained in the transgenic lines both during elongation and secondary wall synthesis of cotton fiber development. HVI test analysis indicated 5-10% improvement in fiber quality. Three lines with high transgene expression and a control null line were subjected to severe drought stress during flowering and boll development. Water deficit did not reduce the extractable FRK activity of the transgenic plants relative to that for the nulls. Although two lines had improved seed cotton yield under water deficit, very small genotypic differences in fiber quality were noted. Thus, during severe drought, constitutive, elevated FRK activity may not benefit fiber quality to a great extent but may increase the yield of late-developing bolls. Both well watered and drought treated transformants had 17-30% greater stem diameters than nulls, implying that a relationship did exist between elevated FRK activity and xylem development that could strengthen plants and improve water conduction.

## **58 – CARBON AND NITROGEN CYCLES OF THREE GRAZING SYSTEMS**

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Carbon and nitrogen cycles are of interest in agroecosystems because of fertilizer expense, the effects of C and N on soil quality and productivity, and pollution caused by losses of C and N to water bodies and the atmosphere. We measured and calculated above-ground C and N flows in three grazing systems located in the Texas high plains. We also measured soil particulate organic matter C (POM-C) and mineral associated C (MAC). Systems were grazed by beef steers (*Bos taurus*) and varied in intensity of fertilization, irrigation, and stocking rate. Magnitude of C and N flows were greatest for the high-intensity system. With increasing intensity, a greater proportion of plant C and N was consumed by steers but was always less than 50%. Protein supplementation provided to steers was a biologically significant part of the N cycle only in the least intensive system. For all systems, N export in steers was less than 10% of anthropogenic N additions. Of C consumed, an estimated 39% was excreted in feces, 31% was released as CO<sub>2</sub>, and 4% was released as CH<sub>4</sub>. Our calculations were unable to account for 18% of consumed C. From 16 to 24% of N consumed was retained, with an estimated 66% of N consumed excreted in feces and 6% excreted in urine. Concentration of POM-C indicated the high-intensity system is accumulating C in soils more rapidly than the other systems, and that it will likely continue to do so, despite exporting more C ha<sup>-1</sup> in steers.

## **59 – HETEROLOGOUS EXPRESSION OF A RICE SUMO E3 LIGASE ENHANCES HEAT TOLERANCE IN TRANSGENIC COTTON**

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Abiotic stresses such as drought, salinity and extreme temperatures are major threats to agriculture. These stresses lead to a series of morphological, physiological, biochemical and molecular changes in plants that adversely affect plant growth and productivity. High temperature stress adversely affects plants by causing membrane integrity loss, production of reactive oxygen species, protein inactivation or

denaturation, which ultimately leads to cell death. Plants have inherent survival strategies to tolerate high temperatures which include membrane compositional changes necessary for maintenance of functional integrity, activation of oxidative defense systems through ethylene and salicylic acid production and production of heat shock proteins necessary for cellular protection. Earlier researches indicate that high temperature induces conjugation of SUMO (small ubiquitin like modifier) to peptides called sumoylation which is probably a protective response to high temperatures stress. *SIZ1* encodes a SUMO E3 ligase that facilitates sumoylation of transcription factors like HSFs (heat shock transcription factors). Activation of heat shock transcription factors increases their affinity for heat shock elements. These processes later aid in the transient production of heat shock proteins (HSPs). HSPs are molecular chaperones that reduce protein denaturation, target denatured proteins to 26S proteasome for destruction, facilitate protein folding necessary for protein maturation and renaturation, and regulate activity of HSFs to control HSP gene expression during thermotolerance acquisition. We speculate that if *SIZ1* is overexpressed in cotton plants, it might confer plants increased heat tolerance and thus benefit the West Texas farmers by minimizing yield loss under high temperature conditions.

## **60 – EXPLORING NON-ADDITIVE EFFECTS IN THE FLAMMABILITY OF FOREST LITTER**

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Non-additive effects of individual species traits have been observed in studies of multi-species litter decomposition. My current work is the first to demonstrate such non-additive effects in flammability and preliminary results show consistent differences across species and demonstrate that different components of flammability respond to different leaf traits. Most importantly, flammability components show consistent positive non-additivity: mixtures are more flammable than predicted based on individual species trials. The proposed research aims to expand this work and add ecological realism by investigating other axes of variation including moisture effects, and decomposition interactions. I will evaluate moisture effects on flammability of diverse types of leaf litter from eight species in mixed-conifer stands in the Sierra Nevada, California with the use of a burn table in a range (5 – 30%) of fuel moistures. Chemical analysis will be performed to assess volatile, phosphorus and nitrogen content. Mesh litter bags will be placed at six different locations (2 aspects, 3 elevations), to study decomposition. 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 research provides a better understanding of ecological function in this forest system, as well as a technical foundation that will assist fire management actions and conservation efforts.

## **61 – PHYLOGEOGRAPHY AND MORPHOLOGY OF INSULAR OTTOMAN VIPERS (*MONTIVIPERA XANTHINA*) IN THE EASTERN AEGEAN ISLANDS, GREECE**

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The Ottoman viper (*Montivipera xanthina*) is a widely distributed species in Turkey and in the most western part of the species' range it inhabits several of the eastern Aegean islands of Greece. There has never been any investigation of the species' diversity across its range nor have there been any analyses between the insular and mainland populations. It is our goal to collect blood/tissue and morphological measurements from Ottoman vipers on 11 islands in the eastern Aegean in order to analyze any evolutionary changes caused by insular isolation, genetically and morphologically. This will serve our greater goal to help conserve insular populations of vipers in the Aegean and to understand evolutionary effects of fragmentation, climate change and rising sea levels. Through these analyses the phylogeography of the Ottoman viper will be assessed among the eastern Aegean islands which are the most fragmented and isolated populations in all the species' range.

## **62 – EFFECTS OF PROLONGED DESICCATION ON INVERTEBRATE SEEDBANKS OF PLAYA WETLANDS.**

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Current weather patterns across the Southern High Plains of the USA have been experiencing longer durations of decreased precipitation. Due to this, many aquatic systems and their communities have been affected by the water levels and decreased hydroperiod. With climate patterns for the region projected to increase in temperature and decrease in precipitation, it is expected that playas will experience longer periods of desiccation. Aquatic and semi-aquatic invertebrates are some of the dominant organisms inhabiting playas. Many invertebrate groups are able to survive in these dry environments by entering desiccation-resistant dormant forms (e.g. eggs), forming invertebrate seedbanks. Here we propose a study of the invertebrate seedbanks of playa wetlands and how length of desiccation affects invertebrate diversity and abundance. Emerged invertebrate diversity and abundances from soil and plant material samples will be examined after re-inundation in the lab. Three 80x40cm soil divots of 10cm depth will be collected from a playa in Castro County, TX. Each divot will be divided into six 40x20cm portions. One portion will be wetted in the lab immediately after collection, whereas the others will be stored and re-wetted after 1 month, 3 months, 6 months, 1 year and 2 years have elapsed, respectively. An initial and weekly soil cores (10cm diameter and 10cm depth) will be taken over a four-week period, with invertebrates being sorted and identified. We predict that decreases in diversity and abundance of emerged invertebrates will occur with prolonged desiccation, allowing us to predict community-level effects from climate change in this region.

## **63 – CRICETIDS AS A PHYLOGEOGRAPHICAL MODEL FOR UNDERSTANDING SPECIES DIVERSITY IN THE MESOAMERICAN HIGHLANDS**

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The evolutionary history of the Mesoamerican highlands has been shaped by geological and climatic events over the past several million years. The impacts of these historical events on diversification in montane taxa, however, remain uncertain as a result of lack of studies on broadly distributed highland taxa. The aim of this project is investigate the tempo and mode of genetic diversification in widely distributed highland cricetid taxa to help develop a better understanding of the complex processes structuring biological diversity in the Mesoamerica. The objectives are to examine 10 species of cricetid rodents whose distribution spans the Isthmus of Tehuantepec and use inferred phylogeographic relationships and divergence times for species of *Peromyscus*, *Reithrodontomys*, *Nyctomys*, and *Baiomys* to identify broad-scale historical events that might have shaped the evolutionary history of the highland taxa. Analysis will include estimated lineage divergence dates and diversification rate from mitochondrial DNA sequences of cricetids, and combined divergence dates with reconstructions of ancestral geographic ranges to track lineage diversification across geography through time. To date, phylogenetic trees based on mitochondrial DNA sequence data have been generated with 8 species of Mesoamerican cricetid rodents. Preliminary results suggested that Isthmus of Tehuantepec is separating widely distributed species. However taxa such as *Baiomys musculus* and *Nyctomys sumuhrasti* are showing patterns that do not correspond with the division noticed on other taxa, probably due to their distributional pattern. More data and taxa are required to support hypotheses of expansion of distribution and colonization followed by speciation of cricetid rodents on Mesoamerica.

## **64 – HETEROSPECIFIC ALARM CALL RECOGNITION AND UTILIZATION IN TIME AND SPACE**

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One of the strongest selective pressures on an organism is predation. Due to this strong pressure, eavesdropping on heterospecific alarm calls may provide an animal additional information about the

presence of potential predators. However, most of our current knowledge about heterospecific eavesdropping on alarm calls have used traditional vigilance measures (i.e., head raises or scan rate) as a measure of an individual's perceived predation risk. While these measurements are valuable, they are only able to provide information about perceived predation risk at a single moment in time and point in space. Optimal foraging theory provides a technique, called giving-up-densities, which can be used to quantify perceived predation risk over time and space. Gray duiker are small, nocturnal antelope found in sub-Saharan Africa. Gray duiker occur sympatrically and share the same predators as another antelope species, the bushbuck, which produce an alarm call specific to leopards. I conducted a playback experiment to test if gray duiker recognize and utilize heterospecific alarm calls in adjusting their perceived predation risk in times and space, collecting giving-up-densities and traditional vigilance measures. I will be expanding this design to include GPS collared individuals to quantify differences in microhabitat choices during time periods of increased perceived predation risk. This research is crucial to determine if reaction to heterospecific alarm calls truly have ecological consequences. This study of heterospecific information transfer will also yield a greater understanding of the complexity of animal communication networks and increase our knowledge of how animals assess risk in their environment.

## **65 – SEASONAL AND REPRODUCTIVE DEN SITE FIDELITY IN THE AMERICAN HOG-NOSED SKUNK**

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On a range-wide level, the hog-nosed skunk, *Conepatus leuconotus*, is one of the least studied skunk species. Consequently, knowledge of their basic biology and general denning ecology remains scarce, particularly with regards to maternal den use patterns. From April 2010 to September 2011, seasonal and reproductive den site fidelity was studied to estimate the frequency of den site changes of 16 radiocollared skunks (10 females, 6 males) in west-central Texas. Den site fidelity was assessed by calculating a monthly den-shift index (DSI) for each animal as the ratio of detected den shifts to the maximum number of possible shifts and ranges from 0 to 1; DSIs closer to 1 indicate a lower degree of den site fidelity. For the duration of the study, males generally demonstrated higher DSIs than females, suggesting an overall greater tendency to change den sites. During the reproductive periods (March—mid-August) of both seasons, maternal females exhibited lower DSIs than both males and non-maternal females, suggesting higher den site fidelity. While this can likely be attributed to the immobility and vulnerability of young, graphical interpretation of mean-monthly DSIs provided the opportunity to propose potential reproductive stages for the species. For example, the higher DSI observed by nursing females in March, relative to April and May, may be the result of an increase in parasite-load inside the den following parturition. The apparent increase in DSI in June and July could signify the end of the weaning period and beginning of assisted foraging of the offspring.

## **66 – COMBINED IMPACTS OF PREDATOR STRESS AND PREDICTED CLIMATE INDUCED CHANGES IN TEMPERATURE AND SALINITY ON FRESHWATER GASTROPODS**

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Climate change projections for some regions indicate more extreme fluctuations including erratic precipitation and global temperature increases. Unpredictable rain events can be especially harmful in arid or semi-arid regions where many freshwater systems are dependent on filling of ephemeral ponds. In the Southern High Plains, gastropods comprise a large portion of the invertebrate biomass and are important prey species for many aquatic and terrestrial animals. Hence, understanding how predator pressure, temperature and salinity impact gastropods may provide insight into higher-level wetland effects. We exposed snails (*Helisoma trivolvis*) to a range of environmentally relevant salinities (300 – 4000  $\mu\text{S cm}^{-1}$ ) and temperatures (20 – 30 °C). Each treatment had an alarm/predator cue (cue) counterpart. Highest mortality was observed in the combined high-temperature, high-salinity treatment. Furthermore, morphological changes in shell shape and overall snail size were most affected by the presence of cue;

however, the combination of increased salinity and temperature also influenced snail mass and shell thickness, respectively. Reproduction was severely delayed in cue treatments regardless of temperature and salinity stressors. Overall, snail growth and reproduction were largely driven by cue exposure. Integrated assessment of abiotic and biotic stressors provides insight into potential impacts to gastropod communities under current climate change projections.

## **67 – NITROGEN FACILITATED INVASION OF *PHALARIS ARUNDINACEA* INTO *CAREX STRICTA*-DOMINATED WETLANDS**

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The invasion of *Phalaris arundinacea* in wetlands inhabited by the native sedge, *Carex stricta*, is an ideal model system to study the physiological effects of eutrophication on invasion. Present research is addressing the following questions: (1) Do seasonal changes affect leaf traits and nitrogen assimilatory processes of each species?; (2) Does soil nitrogen vary seasonally?; (3) Does soil nitrogen form affect the performance of either species? Data were collected from a *Carex*-dominated sedge meadow and an adjacent *Phalaris*-dominated site in north-central Indiana during spring, summer, and autumn in 2011. Leaf tissue and soil samples were collected seasonally from each site for both species. *Phalaris* exhibited more leaf nitrate reductase activity in both sites, with higher activity in the *Phalaris*-dominated site. Leaf nitrogen was higher in *Phalaris* compared to *Carex* in both sites and did not vary seasonally in *Phalaris*, but decreased seasonally in *Carex*. The soil in the *Phalaris*-dominated site had more nitrate than the *Carex*-dominated site while the *Carex*-dominated site had more ammonium seasonally. By autumn, the *Phalaris* site had ~three fold the nitrate of the *Carex* site, consistent with the two fold greater leaf nitrate reductase activity in *Phalaris* compared to *Carex*. These data indicate that *Carex* slows down its incorporation of nitrogen into its leaves earlier in the year than *Phalaris*, potentially giving *Phalaris* an advantage to invade more space from summer into autumn. Also, the nitrate reductase and soil nitrogen data suggest that *Phalaris* responds better to high nitrate levels than *Carex*.

## **68 – PHYLOGEOGRAPHY AND SPECIES-LEVEL DIVERSITY WITHIN THE SOUTHEAST ASIAN ROUND-LEAF BATS (CHIROPTERA: HIPPOSIDERIDAE), BASED ON GENETICS, MORPHOLOGY AND ECHOLOCATION CALL FREQUENCIES**

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*Hipposideros bicolor* is a member of the *bicolor* species group which encloses half of all named species in the genus *Hipposideros*, including representatives from Africa and Madagascar, across southern Asia to Japan, and northern Australia. Larger geographic range coupled with cryptic morphology and poor descriptions of type specimen have convoluted the taxonomy of this group. Our study investigates the taxonomy of *H. bicolor* and its allies, to uncover the diversity and diversification mode in Southeast Asia. We examined the genetics (CYT-B, ND2, RAG1), morphology, and acoustic variations among currently recognized *H. ater*, *H. atrox*, *H. bicolor*, *H. cineraceus*, *H. doriae*, and *H. dyacorum*. Mitochondrial DNA analyses recovered three genetically diverged phylogroups within *H. bicolor* (3 – 7%), *H. ater* (8 – 17%), and *H. cineraceus* (5 – 7%), and one phylogroup for *H. atrox*, *H. doriae* and *H. dyacorum*. Morphological analyses using DFA able to classify the specimens according to their phylogroups with 70 – 100 % certainty. However, among the three species with multiple phylogroups, only *H. ater* and *H. cineraceus* had unique echolocation frequencies identifying each phylogroup, whereas *H. bicolor* showed no significant variation among the phylogroups. Although shift in echolocation call has been hypothesized as the initial step for assortative mating, leading to speciation event, data from *H. bicolor* showed genetic divergence occurred before changes in echolocation frequency. Alternatively *H. bicolor*



lineages identified here may represent a single species with high genetic variation. Herein we discuss the potential speciation mechanisms that are involved in shaping bat species diversity in Southeast Asia.

### **69 – MOLECULAR EVIDENCE FOR PARAPHYLY IN *NYCTOMYS SUMICHRASTI*: SUPPORT FOR A NEW GENUS OF VESPER MICE?**

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DNA sequences were obtained from the mitochondrial cytochrome-*b* gene of nine specimens of *Nyctomys sumichrasti* collected in Mexico and Central America. Phylogenetic analysis (Bayesian Inference) of these sequences document heretofore unrecognized patterns in genetic diversity among phylogroups that: 1) indicated substantial levels of genetic divergence among phylogroups; 2) resulted in paraphyly of taxa currently recognized as *N. sumichrasti*; and 3) argued for a re-assessment of the current taxonomy of *Nyctomys* and perhaps recognition of a new genus.

### **70 – A MORPHOLOGICAL COMPARISON OF THE LAND SNAILS *HOLOSPIRA MONCLOVANA* AND *HOLOSPIRA PICTA* (GASTROPODA: UROCOPTIDAE) FROM NORTHERN MEXICO USING X-RAY COMPUTED TOMOGRAPHY**

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Land snails of the genus *Holospira* inhabit the semiarid and desert areas from the southwestern United States to central Mexico. Variations in shell morphology, particularly those associated with the internal lamellae of the last two columnar whorls, have been utilized in most taxonomic assignments and systematic revisions. This study was undertaken to re-examine the taxonomic placement of two species of holospirids from near Monclova, Coahuila, Mexico using more recently developed investigative techniques which were not available to researchers at the time of the original descriptions of these two species. X-ray computed tomography was used to scan both the paratypic series (n = 25) and holotype of *Holospira monclovana*, the paratypic series (n = 25) and holotype of *Holospira picta*, and another series of specimens from approximately 35 km southeast of Monclova which were assigned to *Holospira picta* by the original author. X-ray computed tomography scans of all specimens were analyzed using the Program IMAGEJ. Linear measurements were recorded as ratios of total length. Two Analyses of Similarities (ANOSIM) were conducted using the statistical Program R - one comparing the holotype and paratypic series of *H. monclovana* with those of *H. picta*, and the other comparing the holotype and paratypic series of *H. picta* with the series of *H. picta* from southeast of Monclova (Null hypothesis:  $R \approx 0$ ; dissimilarities within groups  $\geq$  dissimilarities between groups). Analysis supports the retention of *H. monclovana* within subgenus *Holospira* and support the reassignment of both populations of *H. picta* to the subgenus *Bostrichocentrum*.

### **71 – SYSTEMATICS OF *RHINOLOPHUS PEARSONII* IN SOUTHEAST ASIA.**

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Horseshoe bats (Rhinolophidae) represent a diverse and broadly distributed family of bats in the Old World. *Rhinolophus pearsonii* forms a widely distributed species complex, particularly in Southeast Asia. Recent work has uncovered several new species in this species complex, but much geographic variation remains to be documented and studied in detail. In this study, we examined specimens of *R. pearsonii* (*sensu lato*) from Laos (n=14), China (n=21), Vietnam (n=19), and Thailand (n=10). Bivariate plots and univariate statistical tests of collated craniometric data showed that specimens from Laos and

central and southern Thailand were smaller than those from China, Vietnam, and northern Thailand. Principal component analysis also showed that most character variation (with the exception of interorbital breadth) was related to size (PC1 = 81%). Qualitatively, individuals from Laos and Thailand (excluding northern Thailand) had smaller and more gracile skulls. Preliminary genetic analysis of a 658 base-pair region of the mitochondrial cytochrome c oxidase subunit I (COI; “barcoding”) gene revealed some phylogeographic structuring with specimens from Vietnam and China clustering separately from one other, but most vouchered material from Laos and Thailand have yet to be genetically assessed. Altogether, our results showed that specimens originating from Laos and central and southern Thailand were craniometrically distinct and may possibly represent undescribed taxa in the *R. pearsonii* species complex in Southeast Asia, but further study will be required to test this supposition.

## **72 – EFFECTS OF THYROID ENDOCRINE DISRUPTION ON THE DEVELOPMENTAL MORPHOMETRY OF ZEBRAFISH (*Danio rerio*)**

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This study was conducted to determine if disruption of thyroid endocrine system of zebrafish affects its developmental morphometry. Three-day postfertilization (dpf) larvae were reared in control (reconstituted water), 0.15 mM methimazole [MMI, a thyroid hormone (TH) synthesis inhibitor], mixture of MMI and TH (T4, 2 nM) or T4 media until 33 dpf, and then in reconstituted water until 45 dpf. Samples were taken at 33 and 45 dpf for multiple morphometric determinations (structure lengths or distances from snout). All values were corrected for standard length. At 33 dpf, none of the morphometric variables measured showed consistent treatment-associated trend. At 45 dpf, pectoral fin length was positively associated with TH; anal fin base length was also weakly associated positively with TH. Conversely, head length and position of the pectoral fin (relative to snout) showed a trend to be inversely associated with TH. Overall the results of this study indicate that thyroid endocrine status influences certain morphometric features of developing zebrafish, especially the size and relative position of pectoral fins as well as craniofacial development of zebrafish.

## **73 – ACUTE AND CHRONIC TOXICITY OF THE HERBICIDE TRIFLURALIN TO TADPOLES OF THE GREEN FROG (*LITHOBATES CLAMITANS*)**

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Despite greater application rates, there are fewer toxicity studies on herbicides compared to insecticides. Of the few herbicides that have been investigated, atrazine and glyphosate (sold as Roundup in the United States) have received the greatest research interest. We performed acute toxicity tests with 2 common herbicides that have received relatively little attention in amphibian ecotoxicology: trifluralin (sold as Treflan 4D) and pendimethalin (sold as Prowl 400 EC) and compared acute toxicity to a common insecticide (malathion) and pure trifluralin. We also performed chronic toxicity tests with pure trifluralin (2,6-Dinitro-*N,N*-dipropyl-4-(trifluoromethyl)aniline) on amphibian larvae. Chronic toxicity treatments consisted of controls (no trifluralin added), an environmentally relevant concentration of 20 µg/L and a higher (but much less common) concentration of 200 µg/L for 62 days. Both Treflan 4D and Prowl 400EC were significantly more toxic to tadpoles of the green frog than either malathion or pure trifluralin. Chronic exposure to pure trifluralin resulted in significantly smaller tadpoles at environmentally relevant concentrations (20 µg/L) compared to controls and a high-end concentration of 200 µg/L. Acute toxicity is similar to increasing research suggesting that some pesticide formulations are much more toxic to amphibians than pure active ingredients. Chronic toxicity results suggest a “non-monotonic” response of amphibians to trifluralin, but the exact mechanism is not known.

## **74 – ACUTE TOXICITY OF CHLOROTHALONIL TO AFRICAN CLAWED FROG *XENOPUS LAEVIS***

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Chlorothalonil is a widely used broad spectrum, non-systemic fungicide. Although studies have suggested that chlorothalonil is highly toxic to fish and invertebrates, little is known about the impact of chlorothalonil on amphibians. Therefore, we evaluated the acute toxicity of chlorothalonil on two developmental stages of African clawed frog (*Xenopus laevis*; NF stage 8-11 embryos and stage 45-46 larvae). Embryos are less sensitive to chlorothalonil compared to larvae, with 96-h LC50s of 42.14 µg/L (95%CI: 39.67-44.94 µg/L) for embryos and 11.65 µg/L (95%CI: 10.43-12.67 µg/L) for larvae. Embryos exposed to 36 µg/L chlorothalonil showed abnormal gut coiling. Interestingly, chlorothalonil caused tail regression in larvae. However, tail regression was not observed in embryos. Our results indicate that chlorothalonil could be highly toxic to *X. laevis* embryos and larvae, and exposure in larval stage may cause more significant lethal and developmental effects. Future studies on the mechanism of tail regression caused by chlorothalonil and evaluation of chlorothalonil toxicity in North American amphibians are recommended.

## **75 – LEACHING OF PHTHALATE ESTER PLASTICIZERS INTO AQUATIC MESOCOSMS COMPOSED OF VARYING PLASTICS**

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Aquatic mesocosms, often used in ecology and ecotoxicology research, are constructed of plastic materials that have the potential to be unintentional sources of chemicals in the aquatic test environment as a result of leaching. Phthalate esters are a group of chemicals added to plastics to impart characteristics such as pliability. Research on a variety of taxa including aquatic organisms suggests that phthalates are endocrine disrupting chemicals with dramatic effects on developing animals. We quantified the leaching of six common phthalates (DMP, DEP, DBP, BBP, DEHP, DNOP) into mesocosm water every two weeks over the course of two months. Three different mesocosm types (PVC, polypropylene, fiberglass coated) were examined to determine if leaching behavior differed between plastics. Planktonic and invertebrate communities were established in additional polypropylene mesocosms to investigate community effects on leaching. Total phthalate concentration was significantly impacted by mesocosm type, timepoint, and time x type interaction ( $p < 0.001$ ). For individual mesocosm types, timepoint and phthalate congener significantly influenced concentration (all  $p < 0.001$ ). Increased concentrations in community mesocosms and high DEHP concentrations seem to be the driving force in observed statistical differences. While observed phthalate concentrations are unlikely to cause mortality, concentrations of DBP and DEHP in this study were above the lowest values that impacted tadpole reproductive system development in previously published laboratory based studies. Phthalates leaching from mesocosms should be given consideration as confounding factors when endocrine-sensitive endpoints are involved.

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