

117th Annual Meeting of the Texas Academy of Science



March 7-8, 2014
Texas A&M University at Galveston
Galveston, Texas

ACKNOWLEDGEMENTS FROM THE PROGRAM CHAIR

I would like to thank everyone for coming to this year's Texas Academy of Science meeting in Galveston Texas this 2014. This is a year of many firsts for our academy, including our first two day meeting, a new abstract submission system for meeting management, and other technological advances to try to move us forward as a scientific society in the current decade. This meeting would not be possible without the work of many people, as a great many thanks are needed in this regard.

First of all, I would like to thank our new Finance and Development Committee and their hard work to acquire sponsored funding for this meeting. Thanks to Romi Burks and Jason Locklin for helping to get our corporate sponsors listed in the following page. This funding drive has enabled us to continue to provide the level of student funding and awards we have come to expect from the academy, and I hope this trend can not only continue, but expand in the future.

Although I was technically the Program Chair for this meeting, I could not have done it without the amazing assistance from our Coordinator of Information and Technology, Chris Vitek. He has done so much in regards to working with the new software for abstract submission, review, and program development, that he has in reality been the co-Chair for this meeting. Between working on the abstract system, maintaining the web page, and handling a landslide of correspondence, I and future Program Chairs are deeply in his debt.

The organization of the sections and review of the all the great talks and posters have been made possible by the hard work of the various section chairs of the academy. Every section has really put the effort in to make sure that we can provide the best meeting experience possible, and all of this has been done out of their love of the academy and what it means to all of us. As you attend your sections for talks and stay at the section meeting to discuss future business, don't forget to thank these hard working individuals. If you personally want to be more involved in the Academy and its inner workings, consider running for a section Chair or Vice Chair position. We are always looking for more people to be an integral part of the society.

Next, I would like to thank our local host for this year, Tom Linton. Tom helped to organize an army of volunteers on his campus, and has been available to discuss details with me about the meeting on a daily basis at times in this planning process. It is vital to have someone on the ground who can help with the finer details, and Tom and his local committee have been instrumental in making this meeting possible.

Knowledge and experience can never be underestimated, and thus I have to extend a humble hand of thanks to our President, Cindy Hobson. Her guidance and assistance to organize this meeting was of no insignificance, as she helped to keep us organized and on track. I can only image that there must have been times working with all of us must have felt like herding cats, and I deeply appreciate her help and patience with working with me and the rest of the annual meeting team.

Finally, I need to give a local thanks to my home institution. Dr. Jimmy Case, my Dean and Interim Provost at Sul Ross State University, as well as my current Interim Dean of Arts & Sciences Dr. Jay Downing, have allowed me to work on this program and my duties for the Texas Academy of Science with enthusiastic encouragement. That my school is as excited about this opportunity as I am was a wonderful motivation to do the best job I can, and this helped to keep me working all the hours that this program has taken. I could not have done this without your belief in me.

Christopher M. Ritzi
Program Chair and President-Elect of TAS

ACKNOWLEDGEMENTS FROM THE LOCAL HOST

If it had not been for the untiring assistance of the following people at Texas A&M University Galveston, the 117th Annual Texas Academy of Science conference would have been a pretty drab affair.

Alice Maffay collected the donation monies and kept record of it.

Traci Morris, by sheer force of will, caused the Awards Banquet to be within budget and a well done affair.

Ken Bailey secured, organized and executed the poster event --- and figured out how the poster stands worked ---- both of which were no small feats.

Lisa Webb orchestrated the feeding of the multitudes ---- in a timely, efficient manner.

The Honor Students ---- The Dave Lawhon's Brood ---- performed all the volunteer duties which made for a smooth run event.

The Waterfront Operations crew provided the harbor tours that were such a great success ---- which volunteers from the Corps of Cadets contributed to mightily through their service as tour guides on the trips.

Officer Noed Revilla of the Campus Police arranged the parking ---- always a continuous matter --- so that it occurred without incident.

Bob Mosely of Facilities Services and his band of workers had what we needed where we needed it when we needed it --- a commendable service for the execution of our event.

In this digital, internet, electronic, etc., etc. --- where would we have been without the knowledgeable administering to our needs for all that equipment ---- that which without the presentations would have sagged --- we have John Kovacevich and his band of merry men & women in the Department of Information Services to thank and owe a large debt of gratitude.

And last but certainly not last, the Officers of the Campus TAS Club: Brandon Hill, President; Emilie Johannes, Vice President and Forrest Holt and Carla Ibanez, Secretary. They did all that had to be done before, during and after to make the Conference a success.

Tom Linton
Local Host for 117th Annual Meeting of TAS

THE TEXAS ACADEMY OF SCIENCE

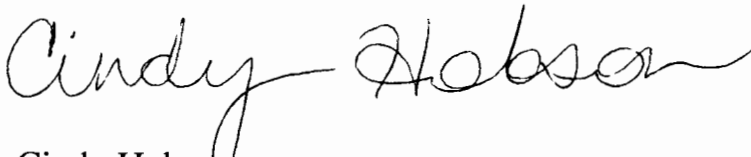
INCORPORATED IN 1929: AFFILIATED WITH THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Welcome to Galveston Island and the 117th Annual Meeting of the Texas Academy of Science! As President of the Academy this year, I have been deeply honored to work with a distinguished and dedicated Board and Planning Committee for this meeting. I hope that, as you enjoy different aspects of this meeting, you take the opportunity to thank one of the many people who are making this meeting possible.

Chances are, you have the opportunity to participate in other scientific societies related to your discipline. But there is something unique and special about Texas Academy of Science that attracts many to volunteer and serve the Academy. It is a passion for science and science education, which is expressed partly in the support, nurture, and guidance of students and young scientists. Science doesn't just happen on its own – it is a discipline and a vocation of people. Like any other vocation, it must be passed on directly from one generation to the other. It is personal.

I hope you take the opportunity to get personal with the Academy at this meeting, and between annual meetings. Please do not hesitate to contact me to learn more about how you can do this: (512) 389-8195 or cindy.hobson@tpwd.texas.gov.

Regards,



Cindy Hobson
President

2013-14 Texas Academy of Science Board of Directors and Contacts

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Harris and Eliza Kempner Fund



Stacy L. Jones



Distinguished Texas Scientist

MICHELLE BUSHEY



Michelle Bushey obtained her undergraduate degree in Chemistry from Oberlin College in 1982. She then spent two years in the Peace Corps teaching high school in rural Kenya. On her return to the US, she entered the chemistry graduate program at the University of North Carolina at Chapel Hill, joining the lab of Jim Jorgenson, and received her Ph. D. in 1990. She then joined the Trinity University Chemistry Department and is now in her 24th year at that institution. Her current primary research interests are in two very different areas. One area of research is elucidating the behavior of organic porous polymer monoliths as stationary phases for use in capillary separations, especially capillary chromatography. Her group examines the fundamental relationship between retention and diffusion of analytes in an effort to understand why these novel materials behave differently from more traditional phases. Her other area of research is in the application of analytical chemistry tools to the analysis of objects of artistic and historical interest. Current projects involve the analysis of frescoes at the Alamo in an attempt to identify the pigments used and an examination of remaining polychrome on a second century marble sculpture at the San Antonio Museum of Art. To date, 98 undergraduates and high school students have participated in her research program. Many have been coauthors on peer-reviewed papers, or have given presentations at national meetings, most often in regular sessions, not student sessions. She was chair of the chemistry department for six years, served on the institutional Commission on Promotion and Tenure, and is currently the coordinator for Trinity's FAST grant program that provides need based financial aid for science and technology students with an emphasis on first generation college students. She is serving a second term as a Chemistry Division Councilor for the Council on Undergraduate Research and currently serves as the Treasurer of the Analytical Division of the American Chemical Society.

Outstanding Texas Educator

MARK MISAGE



Mark Misage earned his B.S. from the University of Texas at Austin and his M.Ed. from the University of Texas at Arlington. He currently teaches AP Physics C at Westlake High School in Austin, Texas working with his wife Nancy who teaches AP Physics B. Over the last 24 years, Mr. Misage has taught physical science, physics, and AP Physics B and C. He co-authored Guerrilla Physical Science for the Real World in 1993, and is active as a consultant, mentoring both teachers and students. Mr. Misage was named in 2004 as having the most successful AP Physics B program in the world, earned the Siemens Award for Math and Science Teachers in 2007, was named most influential teacher by a Presidential Scholar in 2008 and a Coca-Cola Scholar in 2011, and is a Texas state finalist for the 2013 Presidential Award for Excellence in Math and Science Teaching. He is proud that his students perform exceptionally well on the AP Physics C exams, regularly earning a considerable percentage of the passing scores in the state. This success on the exam illustrates how prepared they are to transition into STEM careers becoming the innovators and leaders of the future. More than this, he is fulfilled in the knowledge that students leave his class “haunted” by physics and are never again able to experience the world around them without thinking of the fundamental laws that govern the universe.

2014 Fellow of the Academy

ANDREW KASNER



Dr. Andrew Kasner received a B.S. in Biology from Angelo State University in 1995, an M.S. in Biology from Angelo State University in 1999, and Ph.D. in Wildlife and Fisheries Science from Texas A&M University in 2004. Dr. Kasner was previously on the biology faculty at Lamar University in Beaumont, TX and worked for the National Audubon Society as the Director of Bird Conservation for Audubon Texas. He joined the faculty at Wayland Baptist University as Associate Professor of Biology and Environmental Science in Fall 2009. Dr. Kasner teaches courses in introductory biology, invertebrate biology, vertebrate biology, conservation, and field biology. Dr. Kasner's research interests are focused on the ecology and conservation of vertebrates, especially birds. Dr. Kasner's areas of service to the professional scientific community include membership and leadership roles in several scientific and conservation organizations. He also serves in an advisory capacity on multiple technical committees and boards of advisors. Finally, he is actively involved as a reviewer and editor for scientific proposals and publications. Dr. Kasner has been a Local Committee Host for the 2006 TAS Meeting at Lamar University in Beaumont, a repeat section chair and vice chair for the Conservation and Management, served as the Non-academic Director on the Board of Directors from 2008-2010, was the Executive Secretary from 2010-2013, and most recently has been appointed as the Managing Editor for the Texas journal of Science.

2014 Fellow of the Academy

FRANCISCO GONZALES-LIMA



Francisco Gonzalez-Lima received a B.S. with honors in Biology in 1976 and a B.A. in Psychology in 1977. In 1980, he received a Ph.D. in Anatomy and Neurobiology from the University of Puerto Rico School of Medicine, San Juan. At the age of 24, Dr. Gonzalez-Lima was appointed Assistant Professor of Anatomy at the newly formed Ponce School of Medicine, Ponce, Puerto Rico. He became part of the founding faculty that developed the curriculum and laboratories that brought U.S. accreditation to this medical school in 1980. Special arrangements were made with Ponce School of Medicine so that Dr. Gonzalez-Lima could pursue postdoctoral research training in Germany as a Humboldt Research Fellow in 1982-83. He was recruited to the new College of Medicine of Texas A&M University, where he became Assistant Professor in the Department of Anatomy and Neurobiology in January 1986. After he was recommended for promotion in 1989, the University of Texas at Austin recruited Dr. Gonzalez-Lima and he joined the new Institute for Neuroscience and the Department of Psychology as Associate Professor with tenure in January 1991. In 1997, Dr. Gonzalez-Lima became Professor and Head of Behavioral Neuroscience. In 1999, he received joint appointments as Professor in the Division of Pharmacology and Toxicology. In 2000, he was honored with the first endowed chair named after a Hispanic professor in the USA, the George I. Sanchez Centennial Professorship in Liberal Arts and Sciences. In 2002, Dr. Gonzalez-Lima became Director of the Texas Consortium in Behavioral Neuroscience, a multi-million dollar doctoral and postdoctoral research training consortium of five Texas universities. In 2012, Dr. Gonzalez-Lima became the founding Chair of the Neuroscience section of the Texas Academy of Science and US Councilor of the International Behavioral Neuroscience Society. His laboratory has been at the forefront of neurometabolic studies of animal behavioral functions in the world, translating new interventions for human behavioral disorders and contributing over 300 scientific publications (in peer-reviewed journals, conference proceedings and books).

2014 Fellow of the Academy

FIDELMA ANNE O'LEARY

Having received her Bachelors in English from the University of Ireland, Dr. Fidelma Anne O'Leary received her Ph.D. from the University of Texas Health Science Center in Houston Texas. Her primary area of study has been the cellular mechanism mediating learning. At St. Edwards University, she is currently an Associate Professor of Biology. She has devoted a significant effort to enhancing science education and encouraging hands-on research in those students that look to her. Additionally, she organized her university's Women in Science organization, promoting and encourage young women to be successful in the sciences.

Dr. O'Leary has been an active member of the academy for a number of years, bringing students to the annual meeting and mentoring them on successful award winning presentations since 1998. She has also served as the chair or vice-chair of the Cell & Molecular Biology section many times over the past years, as well as serving as a reviewer for the undergraduate research fellowship awards.

In Memoriam:

Professor J.D. Lewis



Dr. Lewis, who passed away on June 9, had a profound impact on St. Edward's University from the day he began teaching in the department of Chemistry in 1975.

Since then, he taught over 50 different courses in general education, computer science, mathematics, physics, and science. He was influential in expanding the Department of Chemistry's Senior Seminar, and was known for incorporating his wry sense of humor into his courses. He regularly organized trips for students to present their research at national meetings of the American Chemical Society, and was active in mentoring students in undergraduate research, the results of which were frequent collaborative publications in international, peer-reviewed journals. His commitment to teaching was recognized in 1994 when he received the St. Edward's University Teaching Excellence Award, and again in 2013 with the receipt of the Distinguished Career Teaching Award.

Dr. Lewis served in a number of administrative capacities at the university, including as the chair of the Department of Chemistry and subsequently chair of the Division of Physical and Biological Sciences. He was Dean of the School of Natural Sciences, and Vice President for the Undergraduate College.



In Memoriam:

Professor Allan W. Hook

St. Edward's University suffered a loss with the death of Professor Allan William Hook on September 3. Surrounded by family and friends at his home in Austin, Hook died at the age of 59.

Hook began teaching in the School of Natural Sciences in 1988, and he dedicated the next 25 years to teaching his love of evolutionary biology to undergraduates. In his role as

advisor for the St. Edward's chapter of the Academy of Science, Hook took extra time to mentor students in their research and organized trips for students to present their work at statewide meetings. He was also elected a fellow of the Texas Academy of Science.

Hook was the university's second Lucian Professor, and his research focused on the behavior and biodiversity of solitary wasps. In addition to a large body of published research, Hook had the honor of discovering three new species of insects, which now bear his name: *Nemomydas hooki* (Hook's mydas fly) and two wasps — *Solerella hooki* and *Pseudopolis hooki*.

An enthusiastic and highly respected researcher who published numerous papers, Hook continued his studies throughout his teaching career frequently traveling to the rain forests of Trinidad. He received a bachelor's degree in Biology from the University of Maine (Orono) and a master's degree in Entomology and Zoology from the University of Georgia (Athens). He obtained his doctorate in Zoology and Entomology from Colorado State University (Fort Collins).

Hook's passion for conservation and the environment was recently exemplified when he and his wife Rosemary established The Dr. Allan W. Hook Endowed Wild Basin Creative Research Fund. The Hook Endowment provides scholarships to any student in the world interested in conducting creative research at the Wild Basin. Read about the basin and the endowment here: <http://think.stedwards.edu/wildbasin/support-wild-basin>

In Memoriam:

Professor Sammy Ray



Dr. Sammy Ray, a world-renowned marine biologist and one of the founders of Texas A&M University at Galveston, passed away at age 94 on October 14, 2013.

He joined the faculty in 1957 and became an internationally acclaimed scientist for his research in the field of oysters — research that authorities in the field agree had a profound and positive effect on the vital Gulf Coast industry — economically and otherwise. He formally retired in 1990, but continued to conduct research — either in his laboratory on campus or aboard a vessel that bears his name.

For more than half a century, Dr. Ray conducted widely acclaimed research on oyster disease and seafood safety. He invented a diagnostic method to detect the disease agent in oysters in the 1950s while working at Texas A&M Galveston. Today, Dr. Ray's highly reliable diagnostic technique is still the most widely used in oyster disease studies.

“Every day I make it into my lab is a good day,” Dr. Ray often said after his official retirement 23 years ago. He also was an active advisor and coordinator of student programs and several community outreach programs.

Dr. Ray was an authoritative source of scientific information and advice for the State of Texas for many decades. He was actively engaged in the interpretation of scientific knowledge for management decisions related to oyster and shrimp fisheries in the Gulf of Mexico. Over the past 10 years, he participated in both the Joint Interim Committee on the Texas Shrimp and Oyster Industry and the Gulf of Mexico Fishery Management Council. He was a past chair of the Scientific and Technical Advisory Committee for the Galveston Bay National Estuary Program and a member of the Board of Trustees of the Galveston Bay Foundation.

Dr. Ray was born in Mulberry, Kansas. He attended Mississippi Delta Junior College. During World War II he served as a U.S. Navy Pharmacists' Mate 1st Class in the Pacific. After the war, he attended Louisiana State University, where he received his M.A. in biology in 1952. He received a Ph.D. in biology in 1954 from Rice University. His postgraduate career began with the U.S. Fish and Wildlife Service as a fishery research biologist, and he joined the Texas A&M staff in 1957 at the Research Foundation Laboratory on Grande Isle, Louisiana. He became an associate professor in 1963 in Oceanography and Wildlife and Fisheries Science and was named director of the marine laboratory at Galveston. He reached full professor in 1972 and was named head of the Department of Marine Sciences. Since then, he held positions as dean of Texas A&M's Moody College of Marine Technology and interim president of Texas A&M University at Galveston.

Several academic honors have been awarded to Dr. Ray, including the Faculty Distinguished Achievement Award in Research at Texas A&M University at Galveston, the William Paul Ricker Award for Distinguished Faculty-Staff Achievement, a Distinguished Alumnus Award from the Mississippi Delta College, a Piper Professor Award and recently the Distinguished Alumni Award from Rice University. For his more than 50 years of research, he was awarded a lifetime honorary membership in the National Shellfisheries Association.

FRIDAY, MARCH, 7

001. Birding tours

Texas Academy of Science Annual Meeting
Special Event

8:00 am to 12:00 pm

Sea Aggie Center: Foyer

For those interested in the birding trips, please RSVP before the meeting to reserve your place with the appropriate tour guide. The tours will start at their listed locations at 8am on Friday.

Participants:

Stewart Beach at East End of Broadway *Alice Anne Odonell*,
UTMB, aaodonel@utmb.edu

Galveston Island State Park - West End Birding Trip *Richard Peake*,
rpeake1@hotmail.com

002. Board of Directors Meeting

Texas Academy of Science Annual Meeting
Special Event

9:00 to 12:00 pm

Mary Moody Northen Building: Floor 1 - Dining Hall

003. Harbor and Flower Garden Banks Tours

9:00 am to 12:00 pm

Small Boat Basin: Docks

003-1. Harbor Tours

Texas Academy of Science Annual Meeting
Special Event

Harbor tours are offered for 36 people per trip leaving at 9am and 10 am on Friday. Individuals wishing to take a tour need to arrive at the Small Boat Basin 15-20 minutes prior to departure to complete necessary forms. Closed toe shoes are required.

003-2. Flower Garden Banks Tour

Texas Academy of Science Annual Meeting
Special Event

The MANTA is the NOAA vessel that services the Flower Garden Banks National Marine Sanctuary. This vessel berths at TAMUG at the Small Boat Basin and does not leave the docks. From this site, Captain Mike and NOAA officer Jamie Park will conduct informational tours of the Flower Gardens reef at 10, 10:30, 11, and 11:30 am on Friday. Each group can accommodate 25 people per tour, and closed-toed shoes are required. Please meet at the RV Manta on the Clipper Pier prior to one of these tour times to participate.

004. Registration

Texas Academy of Science Annual Meeting
Special Event

12:00 to 6:00 pm

Sea Aggie Center: Foyer

005. Neuroscience Session

Neuroscience
Paper Session

1:45 to 3:00 pm

Classroom Lab Building: Floor 2 - 216

Participants:

005.001 U Cellular and molecular correlates of nerve regeneration in a novel model system, *Lumbriculus variegatus* : A possible role for the Wnt Pathway. *Gicel J. Aguilar*, Univ. of the Incarnate Word; *Pompeyo R. Quesada*,

Univ. of the Incarnate Word; *Veronica G. Martinez Acosta*, Univ. of the Incarnate Word

005.002 U Examining Temporal Relationships Between Amyloid β Accumulation, Reactive Oxygen Species Accumulation, and Loss of Neurological Function in a *C. elegans* Model of Alzheimer's Disease *Matthew Lagarde*, St. Edward's University; *Gilbert Rivera*, St. Edward's University; *Fidelma A. O'Leary*, St. Edward's University

005.003 G Type-2 diabetes-induced inflammation and apoptosis in retina and lateral geniculate nucleus *Carlos A. Garcia*, University of the Incarnate Word; *Maia C. Bland*, University of the Incarnate Word; *Muraya Gonzalez*, University of the Incarnate Word

005.004 NS Memory improvement using near-infrared lasers and LEDs that up-regulate cytochrome oxidase *Francisco Gonzalez-Lima*, University of Texas at Austin; *Douglas W. Barrett*, University of Texas at Austin

Neuroscience Section Meeting *Francisco Gonzalez-Lima*, University of Texas at Austin

Chair:

Francisco Gonzalez-Lima, University of Texas at Austin

006. Cell and Molecular Biology I

Cell and Molecular Biology

Paper Session

2:00 to 3:00 pm

Classroom Lab Building: Floor 1 - 103

Participants:

006.005 U Blood root (*Sanguinaria Canadensis*) disrupts the cell cycle in 4T1 murine breast cancer cells *Thomas Evan McElwain*, Wayland Baptist University; *Sarah Christine Kelly*, Wayland Baptist University; *Jarrett H. Ross*, Wayland Baptist University; *Libby M. Saultz*, Wayland Baptist University; *Gary O. Gray*, Department of Chemistry, Wayland Baptist University; *Adam Reinhart*, Wayland Baptist University

006.006 U Ginger root (*Zingiber officinale*) disrupts the cell cycle in 4T1 murine breast cancer cells *Sarah Christine Kelly*, Wayland Baptist University; *Thomas Evan McElwain*, Wayland Baptist University; *Jarrett H. Ross*, Wayland Baptist University; *Libby M. Saultz*, Wayland Baptist University; *Gary O. Gray*, Department of Chemistry, Wayland Baptist University; *Adam Reinhart*, Wayland Baptist University

006.007 U Investigating essential amino acid metabolism using isobutyric acid-resistant mutants of *Arabidopsis thaliana* *Erica Marina Richardson*, University of Mary Hardin-Baylor; *Andrew W. Woodward*, The University of Mary Hardin-Baylor

006.008 U Survey for the presence of leishmaniasis in canines and felids in Travis County, Texas *Erik Jordan Escobar*, St. Edward's University; *Charles Hauser*, St. Edward's University; *Monica Swartz*, Wild Basin Wilderness Preserve, St. Edward's University

Chairs:

Adam Reinhart, Wayland Baptist University
Amaris Guardiola, Angelo State University

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U = Undergraduate student presentation/poster : G = Graduate student presentation/poster

007. Terrestrial Ecology and Management I

Terrestrial Ecology and Management

Paper Session

2:00 to 3:00 pm

Ocean & Coastal Studies Building: Floor 1 - 142

Participants:

007.009 **G** Function and Structure of Song Delivered by Male Carolina Wrens (*Thryothorus ludovicianus*) During Nestling Provisioning in Urban and Rural Habitats *Claire Randall, Sam Houston State University; Diane Neudorf, Sam Houston State Univ.*

007.010 **G** Habitat Use and Activity Patterns of Western Screech-Owls (*Megascops kennicottii*) in the Davis Mountains of West Texas *Corin M Olivas, Sul Ross State University; Natividad Sandoval, Wayland Baptist University; Andrew Kasner, Wayland Baptist University; Chris M Ritzl, Sul Ross State University*

007.011 **NS** Nesting associations of Altamira Orioles and other birds in the Yucatan Peninsula of Mexico *Timothy Brush, University of Texas-Pan American*

007.012 **U** Herpetofaunal diversity and abundance among different aged burns in a shinnery oak stand *Jacob Kemmer, Wayland Baptist University; Andrew Kasner, Wayland Baptist University*

Chair:

Richard James Wilson Patrock, Kelburg-Kenedy Soil and Water Conservation District

Travis LaDuc, University of Texas at Austin

008. Science Education I

Science Education

Paper Session

2:00 to 3:00 pm

Powell Marine Engineering Complex: Floor 1 - 146

Participants:

008.013 **G** Causal Loop of Intensive Sustainable Professional Development: The Importance of the Relationship Between Facilitators and Teachers and Among Teachers *Michele Mann, University of Texas at Austin; Jair Aguilar, University of Texas at Austin; Wan Sim Lim, University of Texas at Austin*

008.014 **U** Engaging and Retaining Undergraduate Students through Mentored Research *Sofia Caylor, Sul Ross State University*

008.015 **G** Self-efficacy, self-advocacy and first year biology majors *Christopher Golubski, University of Texas at Austin; Michele Mann, University of Texas at Austin*

008.016 **G** Research Supported Rubric for Selection of Professional Development Programs *Michele Mann, University of Texas at Austin*

Chair:

Kiley Miller, Schreiner University

009. Environmental Science I

Environmental Science

Paper Session

2:00 to 3:00 pm

Powell Marine Engineering Complex: Floor 2 - 243

Participants:

009.017 **G** Analysis of Urban sprawl and its effect on Urban Environmental characteristics using spectral reflectance and

NS = Non-student presentation/poster : HS = High School student presentation/poster

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Landsat Data *Gilbert Saah, Texas Southern University*

009.018 **G** Evaluation of *Prymnesium parvum* fatty acid amide accumulation and their contribution to fish mortality events *Sean O'Mara, Texas A&M University Corpus Christi*

009.019 **G** Identification and toxicity assessment of a new to science cyanobacterial toxin *I-Shuo Huang, Texas A&M University-Corpus Christi*

009.020 **G** Phosphorus Retention in Streambank Sediment *Georgiana Hudson, Tarleton State University*

Chairs:

Kristine Lowe, University of Texas - Pan American

Christine M Kolbe, TX Commission on Environmental Quality

010. Collegiate Academy Judging

Texas Academy of Science Annual Meeting

Special Event

2:00 to 6:00 pm

Ocean & Coastal Studies: OCSB 340-C

011. Cell and Molecular Biology II

Cell and Molecular Biology

Paper Session

3:30 to 5:00 pm

Classroom Lab Building: Floor 1 - 103

Participants:

011.021 **U** The roles of SOX9 and SOX11 in skin carcinoma *Derek Thomas Draper, Schreiner University*

011.022 **U** Will exposure to sub-lethal concentrations of Triclosan lead to the development of microbial tetracycline resistance? *Lawrence Henry Edwards, St. Edward's University; John Watts, St. Edward's University*

011.023 **U** Isolating the Impact of Individual Parkinson's Disease Pathologies on Voluntary Motor Control in *C. elegans* *Cassandra Boduch, St. Edward's University; Fidelma A. O'Leary, St. Edward's University*

Cell and Molecular Biology Section Meeting *Adam Reinhart, Wayland Baptist University*

Chairs:

Adam Reinhart, Wayland Baptist University

Amaris Guardiola, Angelo State University

012. Systematics and Evolutionary Biology I

Systematics & Evolutionary Biology

Paper Session

3:30 to 5:00 pm

Ocean & Coastal Studies Building: Floor 1 - 141

Participants:

012.024 **U** A re-examination of the fossil land snails (Gastropoda: Pulmonata) from the Devil's Graveyard Formation of west Texas using CT scanning *Mary Jones, Angelo State University; Ned Strenth, Angelo State University; Alfonso Correa-Sandoval, Instituto Tecnológico de Cd. Victoria, Tamaulipas, Mexico*

012.025 **U** Beyond ancestors, *Gekko gecko* shows more maturity than expected *Aurelia Mapps, Sam Houston State University; Juan D Daza, Sam Houston State University; Patrick J Lewis, Sam Houston State University; Monte Thies, Sam Houston State University*

012.026 **U** Dominance hierarchies, social subjugation, and female reproductive success in a sex-role reversed fish

(*Sygnathus scovelli*) *Janaee Ariel Sasha Wallace, St. Edward's University; Tamara Fraker, St. Edward's University; Sunny Scobell, Brooklyn College; Raelynn Deaton Haynes, St. Edward's University*

- 012.027 **U** Male mosquitofish, but not guppies, alter mating behavior in response to risk of sperm competition *Julian Copado, St. Edward's University; Raelynn Deaton Haynes, St. Edward's University*
- 012.028 **U** Maturation-dependent sperm storage in livebearing fishes *Charline Valeria Mejia, St. Edward's University; Raelynn Deaton Haynes, St. Edward's University; Sean Maguire, University of Texas*
- 012.029 **U** Morphometric predictors of female reproductive output in a sex role reversed fish *Mark Alex Greco, St. Edward's University; Tamara Fraker, St. Edward's University; April Navarro, St. Edward's University; Sunny Scobell, Brooklyn College; Janaee Ariel Sasha Wallace, St. Edward's University; Raelynn Deaton Haynes, St. Edward's University*

Chair:

Andrea B Jensen, Hardin-Simmons University

013. Terrestrial Ecology and Management II

Terrestrial Ecology and Management

Paper Session

3:30 to 5:00 pm

Ocean & Coastal Studies Building: Floor 1 - 142

Participants:

- 013.030 **G** Effects of acclimation temperature on the critical thermal limits of the tawny crazy ant (*Nylanderia fulva*) *Lance Cameron Umlang, Sam Houston State University*
- 013.031 **NS** Status of the subtropical tamarisk beetle (*Diorhabda* spp.) as a saltcedar (*Tamarix*) biocontrol agent along the Río Grande in Presidio County and its impact on a non-target species, *Tamarix aphylla* *Anne Marie Hilscher, Sul Ross State University; Chris M Ritzi, Sul Ross State University*
- 013.032 **U** Tardigrade Community Structure in Three Lichen Body Forms *Renee Marie Brammer, Temple College*
- 013.033 **G** Preliminary survey of terrestrial snail species of Bell County, TX *Cecil Anne Lherisson, Univ of Mary Hardin-Baylor; Kathleen Wood, University of Mary Hardin-Baylor*
- 013.034 **G** A comparison of the ectoparasitic fauna of *Peromyscus* and Heteromyidae taxa between Presidio County, TX and Cusuco and La Tigra National Parks in Honduras, Central America *Lizbeth Marquez, Sul Ross State University; Chris M Ritzi, Sul Ross State University*

Chair:

Richard James Wilson Patrock, Kelburg-Kenedy Soil and Water Conservation District
Travis LaDuc, University of Texas at Austin

014. Anthropology

Anthropology

Paper Session

3:30 to 5:00 pm

Powell Marine Engineering Complex: Floor 1 - 144

Participants:

- 014.035 **G** Social Transformations in the Mimbres Region of southern New Mexico from A.D. 1150 to 1450: An

Investigation of the Black Mountain Site (LA 49) *Kathryn Putsavage, University of Colorado, Boulder*

- 014.036 **NS** Recent Archaeological Investigations at San Pedro Springs Park *Stephen Smith, Center for Archaeological Research- UT San Antonio; Sarah Wigley, Center for Archaeological Research, Anthro. UTSA; Kristi Nichols, Center for Archaeological Research@ UT San Antonio; Raymond Mauldin, Center for Archaeological Research, UT San Antonio*

- 014.037 **NS** Seasonal Diet Reconstructed in High Resolution from Stable Carbon and Nitrogen Isotopes in Prehistoric Hair: A Case Study from the Lower Pecos Region of Texas. *Kirsten Verostick, Center for Archaeological Research, University of Texas San Antonio*

- 014.038 **NS** Stable Isotopes and Historic Period Diets at Mission San Juan, Bexar County, Texas. *Cynthia Munoz, Center for Archaeological Research, UTSA; Raymond Mauldin, Center for Archaeological Research, UT San Antonio*

Anthropology Section Meeting *Raymond Mauldin, Center for Archaeological Research, UT San Antonio*

Chair:

Raymond Mauldin, Center for Archaeological Research, UT San Antonio

015. Conservation Ecology I

Conservation Ecology

Paper Session

3:30 to 5:00 pm

Powell Marine Engineering Complex: Floor 1 - 145

Participants:

- 015.039 **G** Barnacles as potential indicators of estuarine system recovery *Crystal Martinez, University of Texas-Brownsville; Alejandro Fierro-Cabo, University of Texas-Brownsville*
- 015.040 **U** Effects of environmental concentrations of malathion on behavior of an exotic invasive fish *Jake Caz Crawley, SCHREINER UNIVERSITY; Chris Distel, Schreiner University*
- 015.041 **U** Exotic armored catfish reduce survival and growth of native amphibians *Courtney Neleigh, Schreiner University; Cynthia Owsley, Schreiner University; Chris Distel, Schreiner University*
- 015.042 **NS** GloBI and GoMexSI: Providing access to a world (and Gulf) of species interactions *James Simons, Texas A&M University-Corpus Christi; Jorrit Poelen, Freelance Software Engineer; Christopher Mungall, Lawrence Berkeley Laboratory; May Yuan, University of Oklahoma; Cristina Carollo, Texas A&M University-Corpus Christi; Marie Eugenia Vega-Cendejas, CINVESTAV; Dave Reed, FWRI*
- 015.043 **NS** Preserving Texas' Endemics: Insight into how understanding individual-level variation in behavior can aid conservation efforts of endangered spring fishes *Raelynn Deaton Haynes, St. Edward's University*

Chair:

Chris Distel, Schreiner University

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016. Science Education II

Science Education

Paper Session

3:30 to 5:00 pm

Powell Marine Engineering Complex: Floor 1 - 146

Participants:

- 016.044 **U** Pink Eggs I am: The making of a clutch deposit informing the public about the invasive apple snail (*Pomacea maculata*) *Rebecca Elaine Petro, Southwestern University*
- 016.045 **NS** STEM principals: What they want and need *Sandra S. West, Texas State University*
- 016.046 **NS** Strategic "Dice"-isionmaking for Can't Stop *Stefan Terence Mecay, Schreiner University*
- 016.047 **NS** Structure and Function of Environmental Education and Literacy in Texas *Thomas L. Arsuffi, Texas Tech University Llano River Field Station; Jenny Strovos, Texas Tech University; Chris Moseley, University of Texas at San Antonio*
- 016.048 **NS** Early research-track coursework enhances upper level learning outcomes *Chris Distel, Schreiner University*
- 016.049 **NS** Teaching with TED *David Brooks, East Texas Baptist University*

Chair:

Kiley Miller, Schreiner University

017. Freshwater Sciences I

Freshwater Science

Paper Session

3:30 to 5:00 pm

Kirkham Hall: Floor 2 - 206

Participants:

- 017.050 Why bigger may not always be better: a comparison of hatchling development of two apple snail species, *Pomacea maculata* and *Pomacea megastoma* *Amber Danae Cochran, Southwestern University*
- 017.051 Effects of mercury deposition, coniferous forests, and fish size on mercury contamination of game fish in the south central U.S. *Ray Drenner, Texas Christian University; Matthew Murray Chumchal, Texas Christian University; Kimberly Adams, Texas Christian University*
- 017.052 **G** Do fish consumption advisories for mercury adequately protect the public? *Kimberly Adams, Texas Christian University; Ray Drenner, Texas Christian University; Matthew Murray Chumchal, Texas Christian University*
- 017.053 Use of methyl mercury as a tracer of aquatic carbon flux to terrestrial consumers *Shannon Speir, Texas Christian University; Matthew Murray Chumchal, Texas Christian University; Ray Drenner, Texas Christian University; Gary Cocke, Texas Christian University; Megan Lewis, Texas Christian University; Holly Whitt, Texas Christian University*
- 017.054 Insect-Mediated Mercury Flux from Artificial Ponds of the Great Plains in a Changing Climate *Matthew Murray Chumchal, Texas Christian University; Ray Drenner, Texas Christian University*
- 017.055 Mercury-contaminated terrestrial spiders pose a potential health risk to songbirds at Caddo Lake, TX/LA *Gretchen Lee Gann, Texas Christian University; Cleveland H Powell, Texas Christian University; Matthew Murray Chumchal, Texas Christian University; Ray Drenner, Texas*

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Christian University

Chair:

Chad Hargrave, Sam Houston State University

018. Marine Sciences I

Marine Science

Paper Session

3:30 to 5:00 pm

Kirkham Hall: Floor 2 - 207

Participants:

- 018.056 **G** Arctic Oil & Gas: Identifying Overlap and Discrepancies in U.S. and State of Alaska Offshore Management Strategies *Emilie Johannes, Texas A&M University at Galveston*
- 018.057 **G** Assessing deep-water coral assemblages inhabiting relict coral banks off the Texas Coast *Rebekah Rodriguez, University of Texas at Brownsville; David W. Hicks, University of Texas at Brownsville; John W. Tunnell, Texas A&M Corpus Christi; Thomas C. Shirley, Texas A&M University-Corpus Christi; Peter J. Etnoyer, National Oceanic and Atmospheric Administration (NOAA)-Coastal Center for Environmental Health and Biomolecular Research; Emma Hickerson, Flower Garden Banks National Marine Sanctuary (FGBNMS)-National Ocean Service (NOS)*
- 018.058 **U** Characterization of two Physical Properties of Feed (Stability and Sinkability) Affecting Consumption Rates in *Litopenaeus vannamei*, Initial Mean Size, 9g/shrimp *Christopher Wade Jones, Texas A&M - Corpus Christi; Ivy C McClellan, Texas A&M- Corpus Christi; Addison L Lawrence, Texas Agrilife Shrimp Mariculture Research Facility; Jessica L Morgan, Texas A&M - College Station*
- 018.059 **G** Culvert reef structure densities may affect fish community diversity in Western Gulf of Mexico *Catheline Yasmin Magali Froehlich, University of Texas at Brownsville; Richard Joseph Kline, University of Texas at Brownsville*
- 018.060 **G** Evaluation of Differing Levels of Canola Protein Concentrate as a Potential Fish Meal Replacement in Pacific White Shrimp *Litopenaeus vannamei* Diets *Ivy C McClellan, Texas A&M- Corpus Christi; Addison L Lawrence, Texas Agrilife Shrimp Mariculture Research Facility; Jessica L Morgan, Texas A&M - College Station*
- 018.061 **G** Quantifying recruitment of juvenile fish at an artificial reef in the Gulf of Mexico *Rachel Arney, University of Texas at Brownsville; Richard Joseph Kline, University of Texas at Brownsville*

Chair:

Thomas Linton, Texas A&M University at Galveston

019. Physics and Computer Science Session

Physics

Paper Session

3:30 to 5:15 pm

Classroom Lab Building: Floor 2 - 216

Participants:

- 019.062 **U** A Concept of Capturing a Fly by Earth Small Asteroids *Tyler Thomas, Midwestern State University; Salim Azzouz, Midwestern State University*
- 019.063 **U** Active Road Rumble Energy Harvesting System *Raymond Tyler Dalke, Midwestern State University; Salim*

Azzouz, *Midwestern State University*; Melody Coffey, *Midwestern State University*; Ryian Williams, *Midwestern State University*; Devyn Sutton, *Midwestern State University*

019.064 **U** Light curves of exoplanets Matthew Davis, *Hardin-Simmons University*; Cassidy Cantu, *Hardin-Simmons University*

019.065 **U** Material Identification Through Spark Observation Raymond Tyler Dalke, *Midwestern State University*; Jan Brink, *Midwestern State University*; Mark Weller, *Midwestern State University*

019.066 **U** Solar Stirling Dish Engine Energy Harvesting Panel Mallory Goon, *Midwestern State University*

019.067 **U** Automated Hydraulic and Pneumatic Drilling Application using a Palletizing Robot Timothy Ray Green
Physics and Computer Science Section meetings Patrick Miller, *Hardin-Simmons University*; Raelynn Deaton Haynes, *St. Edward's University*

020. Environmental Science II

Environmental Science

Paper Session

3:30 to 5:00 pm

Powell Marine Engineering Complex: Floor 2 - 243

Participants:

020.068 **U** Potential effects of destratification on the phytoplankton of the Arroyo Colorado Diana Huallpa, *University of Texas Pan American*; Edwin Quintero, *University of Texas Pan American*; Hudson DeYoe, *University of Texas Pan American*

020.069 **U** Remember the Ocelot: Effects of an international border fence on conservation efforts. Kathryn Michelle Benavidez, *St. Edward's University*

020.070 **NS** Spatial and Temporal Modeling of Hg Fate and Dynamics in East Fork Poplar Creek Watershed Maruthi Sridhar Balaji Bhaskar, *Texas Southern University*

Environmental Science Section Meeting Kristine Lowe, *University of Texas - Pan American*

Chairs:

Kristine Lowe, *University of Texas - Pan American*

Christine M Kolbe, *TX Commission on Environmental Quality*

021. Poster Session I

5:00 to 6:00 pm

P.E. Facility: Floor 1 – McCloy Arena

021-1. Poster Session I

Texas Academy of Science Annual Meeting

Special Event

021-2. Geosciences Poster Session

Geosciences

Poster Session

Participants:

021-2.071 **U** A Taxonomic and Taphonomic Description of a Large Ungulate Fossil from the Chadron Formation of the Buffalo Gap National Grasslands, South Dakota John Hunter Green, *Wayland Baptist University*; Tim Walsh, *Wayland Baptist University*; David Schmidt, *Westminster College*

021-2.072 **NS** Mineralized Springs of Paleozoic Carbonates: Lampasas and San Saba Counties Kevin W Stafford, *Stephen F Austin State University*; Alyx Frantzen, *Stephen F Austin State University*, Department of Chemistry; Melinda Shaw

Faulkner, *Stephen F Austin State University*

021-3. Marine Sciences Poster Session

Marine Science

Poster Session

Participants:

021-3.073 **U** A Pilot Study: Macroalgal preference for *Diadema antillarum* on the meso American reef in Roatan, Honduras Clara Valentina Hernandez, *McLennan Community College*

021-3.074 **U** Anthropogenic Influence on Coral Disease Density in Roatan, Honduras Alexandria Rose Hensel, *McLennan Community College*

021-3.075 **G** Assessment of south Texas black drum health using fatty acid, lipid, and stable isotopic approaches Katherine Grace Sharp, *Texas A&M University Corpus Christi*

021-3.076 **U** Baseline Hematology in *Tursiops truncatus* (Atlantic Bottlenose Dolphins), Roatan, Honduras Connor Blaine Pogue, *McLennan Community College*

021-3.077 **G** Characterization of Follicle Development in the Texas Diamondback Terrapin (*Malaclemys terrapin littoralis*) by Ultrasonography Rachel Rose George, *University of Houston Clear Lake*

021-3.078 **HS** Comparative study of the effects of stormwater discharge on seagrass in the Lower Laguna Madre of Texas Sofia Schachner, *The International Baccalaureate Program at Lamar Academy*; Isaac Lopez, *The International Baccalaureate Program at Lamar Academy*; Eileen Martinez, *The International Baccalaureate Program at Lamar Academy*; Carolina Ramirez, *The International Baccalaureate Program at Lamar Academy*; Julia Goolsby, *The International Baccalaureate Program at Lamar Academy*; Anna McGilvray, *The International Baccalaureate Program at Lamar Academy*; Hudson DeYoe, *University of Texas Pan American*; Joseph Kowalski, *The University of Texas - Pan American*

021-3.079 **HS** Nutrient dynamics of the black mangrove, *Avicennia germinans* (L.) L., in the Lower Laguna Madre of Texas Julia Goolsby, *The International Baccalaureate Program at Lamar Academy*; Eileen Martinez, *The International Baccalaureate Program at Lamar Academy*; Carolina Ramirez, *The International Baccalaureate Program at Lamar Academy*; Sofia Schachner, *The International Baccalaureate Program at Lamar Academy*; Anna McGilvray, *The International Baccalaureate Program at Lamar Academy*; Isaac Lopez, *The International Baccalaureate Program at Lamar Academy*; John Garcia, *University of Texas Pan American*; Hudson DeYoe, *University of Texas Pan American*; Warren Pulich, Jr., *Texas State University - San Marcos*; Joseph Kowalski, *The University of Texas - Pan American*

021-3.080 **HS** Nutrient limitation In the Lower Laguna Madre of Texas Eileen Martinez, *The International Baccalaureate Program at Lamar Academy*; Sofia Schachner, *The International Baccalaureate Program at Lamar Academy*; Carolina Ramirez, *The International Baccalaureate Program at Lamar Academy*; Anna McGilvray, *The International Baccalaureate Program at Lamar Academy*; Isaac Lopez, *The International Baccalaureate Program at Lamar Academy*; Julia Goolsby, *The International Baccalaureate Program at Lamar Academy*; Wendy Rogers,

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University of Texas Pan American; Hudson DeYoe,
University of Texas Pan American; Joseph Kowalski, The
University of Texas - Pan American

- 021-3.081 **U** Photo Identification and Association Patterns of Bottlenose Dolphins (*Tursiops truncatus*) in the Galveston Ship Channel, Texas Kelsey Elizabeth Johnson, TAMUG Marine Mammal Behavioral Ecology Group
- 021-3.082 **U** Potential for San Martin Lake, Texas to support phytoplankton growth Paulina Flores, University of Texas Pan American; Wendy Rogers, University of Texas Pan American; Edwin Quintero, University of Texas Pan American; Hudson DeYoe, University of Texas Pan American
- 021-3.083 **HS** Primary productivity in the Lower Laguna Madre and Arroyo Colorado, Texas Anna McGilvray, The International Baccalaureate Program at Lamar Academy; Julia Goolsby, The International Baccalaureate Program at Lamar Academy; Eileen Martinez, The International Baccalaureate Program at Lamar Academy; Sofia Schachner, The International Baccalaureate Program at Lamar Academy; Carolina Ramirez, The International Baccalaureate Program at Lamar Academy; Isaac Lopez, The International Baccalaureate Program at Lamar Academy; Wendy Rogers, University of Texas Pan American; Hudson DeYoe, University of Texas Pan American; Joseph Kowalski, The University of Texas - Pan American
- 021-3.084 **G** Scope for growth of *Scolecopsis squamata* before and after mercury exposure Debra Hoekel, Texas A&M University- Corpus Christi
- 021-3.085 **HS** Seasonal production and biomass of the subtropical seagrass, *Syringodium filiforme* Kützing (manatee grass) in the Lower Laguna Madre, Texas Carolina Ramirez, The International Baccalaureate Program at Lamar Academy; Sofia Schachner, The International Baccalaureate Program at Lamar Academy; Julia Goolsby, The International Baccalaureate Program at Lamar Academy; Eileen Martinez, The International Baccalaureate Program at Lamar Academy; Anna McGilvray, The International Baccalaureate Program at Lamar Academy; Isaac Lopez, The International Baccalaureate Program at Lamar Academy; John Garcia, University of Texas Pan American; Hudson DeYoe, University of Texas Pan American; Joseph Kowalski, The University of Texas - Pan American
- 021-3.086 **U** Spatial and temporal metagenomic classification of sediment prokaryotic communities inhabiting a hypersaline estuary, the Laguna Madre (Texas, USA) Meghan A Guzman, University of Texas - Pan American; Erin L Schuenzel, University of Texas - Pan American; Kristine Lowe, University of Texas - Pan American

Chair:

Thomas Linton, Texas A&M University at Galveston

021-4. Anthropology Poster Session

Anthropology
Poster Session

Participants:

- 021-4.087 **NS** Developmental simulation of the adult cranial morphology of *Australopithecus sediba* using geometric morphometric techniques Keely Carlson, Texas A&M University; Darryl de Ruiter, Texas A&M University; Kieran McNulty, University of Minnesota; Thomas DeWitt, Texas A&M University; Lee Berger, University of the

Witwatersrand

- 021-4.088 **NS** Patterns in Stable Carbon ($\delta^{13}\text{C}$ collagen, $\delta^{13}\text{C}$ carbonate) and Nitrogen ($\delta^{15}\text{N}$) Isotopes in Bone from Interments in Prehistoric Central Texas. Raymond Mauldin, Center for Archaeological Research, UT San Antonio; Cynthia Munoz, Center for Archaeological Research, UTSA; Robert Hard, Department of Anthropology, UTSA
- 021-4.089 **NS** Toward a Morphometric Phylogeny of Caddo Ceramics: A Test of 3D Geometric Morphometrics Robert Z. Selden Jr., SFASU; Timothy K. Perttula, SFASU; Michael J. O'Brien, University of Missouri
- 021-4.090 **NS** At the Confluence of GIS and Geochemistry: Identifying Geochemical Correlates of Ripley Engraved Caddo Ceramics Robert Z. Selden Jr., SFASU; Timothy K. Perttula, SFASU
- 021-4.091 **NS** Instrumental Neutron Activation Analysis (INAA) of Shell-Tempered Ceramics in the Ancestral Caddo Region: Rethinking Methods Robert Z. Selden Jr., SFASU; Timothy K. Perttula, SFASU
- 021-4.092 **NS** Linking Instrumental Neutron Activation Analysis (INAA) with Geology in the Ancestral Caddo Region Robert Z. Selden Jr., SFASU; Timothy K. Perttula, SFASU

021-5. Botany Poster Session

Botany

Poster Session

Participants:

- 021-5.093 **U** Analysis of prospective PCR-based genetic markers for studying pod morphology variation in *Scorpiurus muricatus* L. Roya P Hossaini, St. Edwards University; Michael A Grusak, USDA-ARS Children's Nutrition Research Center
- 021-5.094 **U** Growth and mineral dynamics in common bean (*Phaseolus vulgaris* L.) pods Caitlin Coghlan, St. Edward's University; Michael A Grusak, USDA-ARS Children's Nutrition Research Center
- 021-5.095 **U** Potential calcium bioavailability of leafy vegetables: *Amaranthus* sps., Gynandropsis gynandra, and Solanum sps. Daisy Yan Ju Chung, Rice University, Houston, TX; Michael A Grusak, USDA-ARS Children's Nutrition Research Center
- 021-5.096 **U** The combined effects of varying nitrogen and water levels on the development and biomass of hard red winter wheat Kevin Obkirchner, St. Edward's University; David R Johnson, St. Edward's University
- 021-5.097 **NS** The story of Texas wild rice, *Zizania texana* Francis Ray Home, Texas State University

021-6. Environmental Science Poster Session

Environmental Science

Poster Session

Participants:

- 021-6.098 **G** Atmospheric Carcinogenic Polycyclic Aromatic Hydrocarbons in Houston, TX, USA: Pine Needles as Passive Samplers Sharmila Bhandari, Texas Southern University
- 021-6.099 **U** Differential impacts of organic and synthetic pesticides on the non-target organism *C. elegans* and on the target organism *Termitoidae* Leah Mulaly, St. Edward's University
- 021-6.100 **G** Effects of wet and dry weather events on bacteria (Enterococci) levels and detection of hotspots in a brackish water marina Ryan Bare

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- 021-6.101 U Proposal for Small-Scale Aquifer Storage and Recovery Systems in Rural Texas *Kayla Leeann Rohrbach, Schreiner University; David Mauk, Bandera County River Authority and Groundwater District; David Jeffery, Bandera County River Authority and Groundwater District; Chris Distel, Schreiner University*
- 021-6.102 G Spatial distribution of *Acer grandidentatum* within the Owl Mountain Province of the Fort Hood Military Installation, Texas *Melinda Shaw Faulkner, Stephen F Austin State University; Matthew W McBroom, Stephen F Austin State University; Kevin W Stafford, Stephen F Austin State University*
- 021-6.103 U Surface Water Quality Assessment of a Stormwater Canal System, Edinburg, Texas *Marisol Bazaldua, Department of Biology, The University of Texas-Pan American; Courtney Huston, Department of Biology, The University of Texas-Pan American; Megan Villarreal, Department of Biology, The University of Texas-Pan American; Frank Joseph Dirrigl Jr, The University of Texas-Pan American*
- 021-6.104 U Barge impacts on Arroyo Colorado water quality *Evan Schauer, University of Texas Pan American; John Garcia, University of Texas Pan American; Diana Huallpa, University of Texas Pan American; Edwin Quintero, University of Texas Pan American; Hudson DeYoe, University of Texas Pan American*

021-7. Terrestrial Ecology and Management Poster Session

Terrestrial Ecology and Management

Poster Session

Participants:

- 021-7.105 U Predator-Prey Interaction of Wolf Spider (*Lycosidae*) and Cricket (*Gryllidae*) in a Controlled Extreme Urban Environment *Angelica Torres, Department of Biology, Midwestern State University; Christopher James, Department of Biology, Midwestern State University; Collin Buerger, Department of Biology, Midwestern State University; Dale B. McDonald, McCoy School of Engineering, Midwestern State University; Michael M Shipley, Midwestern State University*
- 021-7.106 U A Test of the Relative Abundance, Diversity and Distribution of Ants at the Wild Basin Preserve in Relation to Habitat Manipulation for the Black-capped Vireo (*Vireo atricapilla*) *James Thomas LaManna, St. Edward's University; Kendra K. Abbott, St. Edward's University; Stephen Roberts, St. Edward's University*
- 021-7.107 G Characterization of prey availability between Texas diamondback terrapin (*Malaclemys terrapin littoralis*) capture sites and background wetland densities *Bryan Alleman, University of Houston-Clear Lake/EIH; George Guillen, Environmental Institute of Houston*
- 021-7.108 U Does urbanization explain preferential use of alarm calls by Carolina Wrens, *Thryothorus ludovicianus*? *Michelle Yvonne Mullan, Sam Houston State University; Diane Neudorf, Sam Houston State Univ.*
- 021-7.109 G The characterization of shrub density and grass cover in South Texas coastal prairies and the relationship between shrub disturbance and treatment methods on grass regeneration *Parker Watson, University of Texas at Brownsville*

021-8. Physics Poster Session

Physics

Poster Session

Participants:

- 021-8.110 U Analysis of Lorentzian peaks in atomic absorption spectra and shapes of glowing objects from the polarization of light emitted *Sara-jeanne Elizabeth Vogler, Lamar University; Keeley Townley-Smith, Lamar University; James Fairchild, Lamar University; Cristian Bahrim, Lamar University*
- 021-8.111 NS Determination of Spectral Frequencies in G2938 *John McClain, Temple College*
- 021-8.112 U Gear Based Quasi-Continuous Variable Transmission (QCVT) *Dania Wilson, McCoy School of Engineering Midwestern State University*
- 021-8.113 U Radio Astronomy at the Mars Desert Research Station *Kyle Lee Flaherty, McLennan Community College*

022. Friday Night Social

Texas Academy of Science Annual Meeting

Special Event

6:00 to 9:00 pm

OCSB/Small Boat Basin

023. Graduate Panel Discussion

Texas Academy of Science Annual Meeting

Special Event

7:00 to 9:00 pm

Classroom Lab Building: Floor 1 - 100

Participant:

Graduate Student Panel *Danette Rene Vines, Schreiner University*

024. How to Find Your Dream Sciences Job

Texas Academy of Science Annual Meeting

Special Event

7:00 to 9:00 pm

Ocean & Coastal Studies Building: Floor 1 - 142

Your presenter will be Joe Beach, PHR, Human Resources, Texas Parks and Wildlife. Joe is a wildlife biologist and geologist as well as human resources professional. Joe will prepare you to: Master the details of exploring, assessing and conducting your job search; Maximize your chances of being interviewed; Know how to handle some of the major job interview scenarios; Complete federal, state and other governmental applications as well as craft a resume and effective cover letter; Identify and select the best job websites, personal and community resources for your search; Negotiate salary/benefits and evaluate offers; and more! Please RSVP with Marsha may at marsha.may@tpwd.texas.gov or 512-389-8062.

Participant:

How to Find Your Dream Sciences Job *Joe Beach, Texas Parks and Wildlife*

SATURDAY, MARCH, 8

025. Past Presidents Breakfast

Texas Academy of Science Annual Meeting

Special Event

7:00 to 8:00 am

Mary Moody Northen Building: Floor 1 - 125

NS = Non-student presentation/poster : HS = High School student presentation/poster
U = Undergraduate student presentation/poster : G = Graduate student presentation/poster

026. Chemistry and Bio-Chemistry I

Chemistry and Biochemistry

Paper Session

8:30 to 9:45 am

Classroom Lab Building: Floor 1 - 103

Participants:

- 026.114 **G** Computation of homogeneous azeotropes by the Wilson activity model for the ethane-trifluoromethane binary system. *Nilan Jayabahu Kamathewatta, Sam Houston State University; Darren L Williams, Sam Houston State University*
- 026.115 **U** Development of accurate computational methods for predicting the color of nitroaniline *Nathan Cale Baker, Sam Houston State University; Darren L Williams, Sam Houston State University*
- 026.116 **NS** FT-NMR in a shoebox 45 and 82 MHz bench top NMR for students *Cameron Macisaac, Thermo Scientific, Inc.*
- 026.117 **G** Rotational selection rules defined by symmetry, based on the particle on a ring method *Victoria Spenn Jackson, Sam Houston State University; Darren L Williams, Sam Houston State University*
- 026.118 **G** The study of miscibility in the replacement of AK-225 in industrial cleaning applications *James Huskey, Sam Houston State University; Darren L Williams, Sam Houston State University*

027. Systematics and Evolutionary Biology II

Systematics & Evolutionary Biology

Paper Session

8:30 to 9:45 am

Ocean & Coastal Studies Building: Floor 1 - 141

Participants:

- 027.119 **U** Do socially dominant males choose larger females in *Gambusia affinis*, the western mosquitofish? *Natalie Willard, St. Edward's University; J. Alex Carr, St. Edward's University; H. Evans, St. Edward's University; Raelynn Deaton Haynes, St. Edward's University*
- 027.120 **U** Effects of AVT exposure on female-female aggression in *Syngnathus scovelli*: a sex-role reversed species *April Navarro, St. Edward's University; Tamara Fraker, St. Edward's University; Sunny Scobell, Brooklyn College; Raelynn Deaton Haynes, St. Edward's University*
- 027.121 **U** Predictors of social dominance in two species of livebearing fishes that vary in mating strategies *H. Evans, St. Edward's University; J. Alex Carr, St. Edward's University; Natalie Willard, St. Edward's University; Raelynn Deaton Haynes, St. Edward's University*
- 027.122 **U** The gonopodial display: linking function and behavior in a coercive livebearing fish *Lan-Anh Van-Dinh, St. Edward's University; Raelynn Deaton Haynes, St. Edward's University*
- 027.123 **U** Preliminary Results On The Potential Use Of Gamma-Ray Spectrometry To Determine The Absolute Age Of Fossils *George Irwin, Lamar University; Christine Michelle Gartner, Lamar University; James Westgate, Lamar University*

Chair:

Andrea B Jensen, Hardin-Simmons University

028. Terrestrial Ecology and Management III

Terrestrial Ecology and Management

Paper Session

8:30 to 9:45 am

Ocean & Coastal Studies Building: Floor 1 - 142

Participants:

- 028.124 **G** A serologic survey of coyotes (*Canis latrans*) for canine distemper in the trans-pecos region of Texas *John Timothy Stone, Sul Ross State University; Chris M Ritzi, Sul Ross State University*
- 028.125 **G** Assessing capture success of small mammals due to trap orientation in habitats of field-forest edge *Daniel M. Wolcott, Texas State University; Madison R. Ackerman, University of Memphis; Michael L. Kennedy, University of Memphis*
- 028.126 **G** Sabal palm's safety net: coyote's balancing interaction on seed predators *Guillermo Aguilar, University of Texas-Brownsville; Alejandro Fierro-Cabo, University of Texas-Brownsville*
- 028.127 **G** Wildlife Species Associations at Future Wildlife Crossing Locations in South Texas *Sarah E Nordlof, The University of Texas at Brownsville; Richard Joseph Kline, University of Texas at Brownsville*
- 028.128 **NS** The Herps of Texas Project - status of compilation, standardization of museum-vouchered herp data, online database, and related research *Travis J LaDuc, University of Texas at Austin; Ben Labay, Texas Natural History Collection, University of Texas Austin*

Chair:

Richard James Wilson Patrock, Kelburg-Kenedy Soil and Water Conservation District

Travis LaDuc, University of Texas at Austin

029. Conservation Ecology II

Conservation Ecology

Paper Session

8:30 to 9:45 am

Powell Marine Engineering Complex: Floor 1 - 145

Participants:

- 029.129 **U** Analysis of Archaea Soil Microbiome and the Impact of Black Capped Vireo Habitat Restoration Efforts *Dylan Fox, St. Edward's University; Laurie Cannon, St. Edward's University; Lisa O'Donnell, City of Austin, Balcones Canyonlands Preserve; Charles Hauser, St. Edward's University*
- 029.130 **G** Using integrated population models to estimate immigration rate for golden-cheeked warblers *Adam Duarte, Texas State University; Floyd W. Weckerly, Texas State University; Jeff S. Hatfield, USGS Patuxent Wildlife Research Center*
- 029.131 **U** Soil Eubacterial Metagenomics: Implications for Native Plant Restoration at the Black Capped Vireo Research Area and Wild Basin Wilderness Preserve *Laurie Cannon, St. Edward's University; Dylan Fox, St. Edward's University; Lisa O'Donnell, City of Austin, Balcones Canyonlands Preserve; Charles Hauser, St. Edward's University*
- 029.132 **G** Climate change effects on the distribution of twelve endemic lizards, of the genus *Plestiodon*, of Mexico *Mayra*

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Oyervides, University of Texas-Pan American; Rogelio Cazares, University of Texas-Pan American; Manuel Feria, Museo de Zoología, Facultad de Estudios Superiores Zaragoza, Universidad Nacional Autónoma de México; Teresa Patricia Feria, University of Texas-Pan American

- 029.133 **G** The effects of urbanization on physiological stress of Jollyville Plateau salamanders, *Eurycea tonkawae* Drew R Davis, University of South Dakota; Nathan F Bendik, City of Austin; Kristina Zabierek, Texas State University; Caitlin Gabor, Texas State University-San Marcos

Chair:

Chris Distel, Schreiner University

030. Science Education III

Science Education

Paper Session

8:30 to 9:45 am

Powell Marine Engineering Complex: Floor 1 - 146

Participants:

- 030.134 **NS** How a Week Long Summer Program Increases Elementary Students' Motivation in Science? *Mamta Singh, Martin University*
- 030.135 **NS** Informal Learning Environment: Summer Outdoor Experience *Mamta Singh, Martin University*
- 030.136 **NS** Impacts of Active Learning on Higher-Order Thinking in a Physical Geology Class *Carol Thompson, Tarleton State University*
- 030.137 **NS** Safety in U.S. secondary science classrooms *Sandra S, West, Texas State University*

Science Education Section Meeting *Kiley Miller, Schreiner University*

Chair:

Kiley Miller, Schreiner University

031. Freshwater Sciences II

Freshwater Science

Paper Session

8:30 to 9:45 am

Kirkham Hall: Floor 2 - 206

Participants:

- 031.138 **U** How Do You Like Your Eggs (and Hatchlings)? Red-eared slider turtle (*Trachemys scripta elegans*) predation of developing apple snails (*Pomacea maculata*) *Amy Elizabeth Miller, Southwestern University; Alexandria Hill, Southwestern University; Allyson Plantz, Southwestern University; Romi Burks, Southwestern University*
- 031.139 **U** Seasonal Variation in Reproduction of the Largespring Gambusia, *Gambusia geiseri*, in Two Spring Systems in Texas. *Tamara Fraker, St. Edward's University*
- 031.140 **G** Flow-dependent competitive interactions between the invasive *Gambusia geiseri* and endangered *Gambusia nobilis* in a reconstructed desert wetland habitat *Kelbi Delaune, Sam Houston State University; Chad Hargrave, Sam Houston State University*

Chair:

Chad Hargrave, Sam Houston State University

032. Marine Sciences II

Marine Science

Paper Session

8:30 to 9:45 am

Kirkham Hall: Floor 2 - 207

Participants:

- 032.141 **U** A Comparative Cytology of Respiratory Samples of Atlantic Bottlenose Dolphins, (*Tursiops truncatus*) *Desiree Harman, McLennan Community College*
- 032.142 **NS** Coastwide seagrass monitoring for Texas *Cindy Hobson, Texas Parks and Wildlife Department; Adam Whisenant, Texas Parks and Wildlife Department; Jennifer Bronson Warren, Texas Parks and Wildlife Department; Patricia Radloff, Texas Parks and Wildlife Department*
- 032.143 **NS** Reassessment of seagrass distribution and biomass in the Lower Laguna Madre, Texas *Joseph Kowalski, The University of Texas - Pan American; Hudson DeYoe, University of Texas Pan American*
- 032.144 **U** Sargassum Early Advisory System (SEAS): Developing the Best Method of Investigating the Hourly Growth Rate of Sargassum While Suspended in the Neritic Coastal Waters Off of Galveston, Texas *Brandon Hill, Texas A&M University at Galveston; Jeff Frazier, Texas A&M University at Galveston; Robert Webster, Texas A&M University at Galveston; Thomas Linton, Texas A&M University at Galveston*
- 032.145 **NS** Examination of Potential Factors Influencing the Commercial Fisheries of Galveston Bay *George Joseph Guillen, University of Houston Clear Lake*

Chair:

Thomas Linton, Texas A&M University at Galveston

033. Botany Session

Botany

Paper Session

8:30 to 9:45 am

Classroom Lab Building: Floor 2 - 216

Participants:

- 033.146 **U** Effects of annual precipitation on a long-term study to document Guadalupe County flora. *Sally Amaye, Texas Lutheran University*
- 033.147 **U** Preliminary identification of bacteria colonizing the roots of *Acacia smallii* *Codi Diane Hammons, University of Mary Hardin-Baylor; Kathleen Wood, University of Mary Hardin-Baylor*
- 033.148 **G** Isolation, characterization, and quantification of flavonoids from pines (*Pinus cembroides*, *P. edulis*, *P. remota*) and their relation to medicinal use *Lauren Hollis, Sul Ross State University; Martin Terry, Sul Ross State University; Md Kalam, Sul Ross State University*
- 033.149 **G** Outlier populations of Quaking Aspen in the Davis Mountains of west Texas: Clone or clones? *Jerritt Nunneley, UTSA*
- 033.150 **NS** Fossil woods of Terlingua Ranch, Brewster County, Texas *David E Lemke, Texas State University; Alaa Ibrahim, Texas State University; Matthew Donahue, Texas State University*

Botany Section Meeting *Kathleen Wood, University of Mary Hardin-Baylor*

Chairs:

Kathleen Wood, University of Mary Hardin-Baylor
Martin Terry, Sul Ross State University

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034. Registration Continued

Texas Academy of Science Annual Meeting
Special Event
8:30 am to 12:00 pm
Sea Aggie Center: Foyer

035. Collegiate Academy Judging II

Texas Academy of Science Annual Meeting
Special Event
8:30 to 4:45 pm
Classroom Lab Building: OCSB 340-C

036. Chemistry and Bio-Chemistry II

Chemistry and Biochemistry
Paper Session
10:00 to 12:00 pm
Classroom Lab Building: Floor 1 - 103
Participants:

- 036.151 **U** A synthetic route to Fumagillin utilizing SN2' on an aromatic nucleus *Daniel Hicks, Schreiner University; Danette Rene Vines, Schreiner University*
- 036.152 **U** Amine synthesis via metal-catalyzed reduction of amides by silanes: Isolation and reactivity of intermediates *Jorge Luis Martinez, The University of Texas at El Paso; Hemant Sharma, UTEP; Renzo Arias-Ugarte, UTEP; Keith Pannell, UTEP*
- 036.153 **U** Development of a versatile documentation system for bioanalytical methods *Jessica Rose Kenneson, Wayland Baptist University*
- 036.154 **U** Forensic analysis of hand lotions using solid phase extraction and ATR-FTIR spectroscopy *Christopher Jackson, St. Edward's University*
- 036.155 **U** Solvent/triclosan molecular interactions that prevent consistent analysis *Elizabeth A Fawcett, Schreiner University; Kiley Miller, Schreiner University*
- Chemistry and Bio-Chemistry Section Meeting *Danette Rene Vines, Schreiner University*

037. Systematics and Evolutionary Biology III

Systematics & Evolutionary Biology
Paper Session
10:00 to 12:00 pm
Ocean & Coastal Studies Building: Floor 1 - 141
Participants:

- 037.156 **G** Chloroplast DNA sequences and morphological features provide new perspectives on hybridization in *Juniperus* (Cupressaceae) *Jordan Britten, Lamar University; Randall G. Terry, Lamar University*
- 037.157 **G** Molecular, karyotypic, and morphometric evidence for a new species of *Peromyscus* (Rodentia: Cricetidae) from Mexico *Robert D Bradley, Texas Tech University; Nicté Ordóñez-Garza, Texas Tech University; Cibele Sotero-Caio, Texas Tech University; Howard M. Huynh, Texas Tech University; C. William Kilpatrick, University of Vermont; Ignacio Iñiguez-Dávalos, Universidad de Guadalajara; David J. Schmidly, University of New Mexico*
- 037.158 **G** Phylogenetic signal measured by K has a complex relationship with taxon sampling *William Gelnaw, University of Texas at Austin*

- 037.159 **G** Systematics of the Subfamily Neotominae (Rodentia: Cricetidae) based on combined mitochondrial and nuclear DNA sequences *Megan Keith, Texas Tech University; Roy N. Platt II, Mississippi State University; Brian R. Amman, Center for Disease Control; Robert D Bradley, Texas Tech University*

Systematics and Evolutionary Biology Section Meeting *Andrea B Jensen, Hardin-Simmons University; Alicia Kennedy, The University of Texas at Austin*

Chairs:

Andrea B Jensen, Hardin-Simmons University
Alicia Kennedy, The University of Texas at Austin

038. Terrestrial Ecology and Management IV

Terrestrial Ecology and Management
Paper Session
10:00 to 12:00 pm
Ocean & Coastal Studies Building: Floor 1 - 142
Participants:

- 038.160 **G** Cascading effects of animal disturbances to the moss layer on soil characteristics in northeastern Siberia *Aaron Phillip White, The University of Texas at Brownsville; Heather Alexander, University of Texas at Brownsville; Kenneth Pruitt, The University of Texas at Brownsville*
- 038.161 **NS** Determining the drivers of plant community structure of Wild Basin Wilderness Preserve and BCP Vireo Preserve *David R Johnson, St. Edward's University; Mike Satcher, St. Edward's University; Lauren Kelley, St Edward's University; John Brickley, St. Edward's University*
- 038.162 **G** Survival and Growth of Thornscurb Seedlings in Response to Multiple Restoration Strategies *Krysten Dick, The University of Texas at Brownsville; Heather Alexander, University of Texas at Brownsville; Jonathan D Moczygmba, US Fish and Wildlife Service, Laguna Atascosa NWR*
- 038.163 **NS** Flowers visitors on native restoration plants in South Texas *Richard James Wilson Patrock, Kelburg-Kenedy Soil and Water Conservation District; John Reilley, PMC Manager E. "Kika" de la Garza PMC 3409 North FM 1355 Kingsville, Texas 78363*

Terrestrial Ecology and Management Section Meeting *Richard James Wilson Patrock, Kelburg-Kenedy Soil and Water Conservation District; Travis J LaDuc, University of Texas at Austin*

039. Mathematics I

Mathematics
Paper Session
10:00 to 12:00 pm
Powell Marine Engineering Complex: Floor 1 - 144
Participants:

- 039.164 **NS** Results in Finite Geometry Pertaining to Albert-Like Semifields *Angela Michelle Brown, Sul Ross State University*
- 039.165 **U** Knot Selection in Least Squares Approximation with Free Knot Splines *Brian Adamson, Wayland Baptist University*
- 039.166 **U** Characteristics of in-magic digraphs and further research on magic digraphs *Bianca Jayne Perez, Southwestern University*

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- 039.167 **NS** Does oversampling compensate for loss to follow up in survival analysis? *John A Ward, Brooke Army Medical Center*
- 039.168 **NS** Error in non linear regression due to transformation *John T. Sieben, Texas Lutheran University*
Mathematics section meeting *Elsie Mae Campbell, Angelo State University*

040. Conservation Ecology III

Conservation Ecology

Paper Session

10:00 to 12:00 pm

Powell Marine Engineering Complex: Floor 1 - 145

Participants:

- 040.169 **U** Impact of Soil-based Habitat Restoration Treatments at the Black Capped Vireo Research Area and Wild Basin Wilderness Preserve on Fungal Microbiomes
Cody Ramirez, St. Edward's University; Samantha Parsons, St. Edward's University; Lisa O'Donnell, City of Austin, Balcones Canyonlands Preserve; Charles Hauser, St. Edward's University
- 040.170 **G** Movement and genetic patterns of Texas horned lizards (*Phrynosoma cornutum*) in an urban environment
Ashley Wall, Texas Christian University; Dean Williams, Texas Christian University; Daniella Biffi, Texas Christian University
- Conservation Ecology Section Meeting *Chris Distel, Schreiner University*

041. Freshwater Sciences III

Freshwater Science

Paper Session

10:00 to 12:00 pm

Kirkham Hall: Floor 2 - 206

Participants:

- 041.171 **G** Macroinvertebrate community composition of a re-flooded resaca as a potential indicator of successional stage
Leah McIntosh, University of Texas at Brownsville; Alejandro Fierro-Cabo, University of Texas-Brownsville
- 041.172 Texas lotic fish communities: preliminary analysis of spatial patterns
Michael Lane, University of Houston Clear Lake; Stephen Curtis, Environmental Institute of Houston; Jenny Oakley, Environmental Institute of Houston; George Guillen, Environmental Institute of Houston
- 041.173 **NS** Effects of experimental warming on stream ecosystem structure and function
Chad Hargrave, Sam Houston State University; Kaitlen Gary, Sam Houston State University; Jaquiline Lee, Sam Houston State University
- Freshwater Sciences section meeting *Chad Hargrave, Sam Houston State University*

Chair:

Chad Hargrave, Sam Houston State University

042. Marine Sciences III

Marine Science

Paper Session

10:00 to 12:00 pm

Kirkham Hall: Floor 2 - 207

Participants:

- 042.174 **G** Consumer demand and the 19th century decline of Chesapeake Bay marine resources: the case of diamondback

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terrapin and canvasback duck *Raven Delaney Walker, Texas A&M University at Galveston; Josh Carter, Texas A&M University at Galveston*

- 042.175 **G** Scope for growth of *Scolecopsis squamata* before and after mercury exposure
Debra Hoekel, Texas A&M University- Corpus Christi
Marine Science Section Meeting *Thomas Linton, Texas A&M University at Galveston*

Chair:

Thomas Linton, Texas A&M University at Galveston

043. Geosciences

Geosciences

Paper Session

10:00 to 12:00 pm

Classroom Lab Building: Floor 2 - 216

Participants:

- 042.176 **U** A Taxonomic and Geologic Study on an Oreodont Skull Excavated from Buffalo Gap National Grasslands of South Dakota
Garrett Ross Williamson, Wayland Baptist University; Tim Walsh, Wayland Baptist University; David Schmidt, Westminster College
- 042.177 **G** Identification of rodent microfauna using postcrania with implications for paleoenvironmental reconstruction
Timothy Lee Campbell, Department of Anthropology, Texas A&M University; Thomas DeWitt, Texas A&M University; Darryl de Ruiter, Texas A&M University
- 042.178 **NS** Development and Evolution of Galveston Island and Bolivar Peninsula, Texas
Russell LaReill Nielson, Stephen F. Austin State University; Chris A. Barker, Stephen F. Austin State University
- Geosciences Section Meeting *Melinda Shaw Faulkner, Stephen F Austin State University*

Chair:

Melinda Shaw Faulkner, Stephen F Austin State University

044. Lunch

Texas Academy of Science Annual Meeting

Special Event

12:00 to 1:00 pm

Mary Moody Northen Building: Floor 1 - Dining Hall

045. Poster Session II

1:00 to 2:00 pm

P.E. Facility: Floor 1 – McCloy Arena

045-1. Poster Session II

Texas Academy of Science Annual Meeting

Special Event

045-2. Biomedical Poster Session

Biomedical

Poster Session

Participants:

- 045-2.179 **U** Can probiotic bacteria control *Salmonella enterica* St. Paul in the model organism *Caenorhabditis elegans*?
Jana Soares, St. Edward's University; Rachel Murray, St. Edward's University; Patricia J. Baynham, St. Edward's University

045.2-180 U The Effect of Acute Exercise on the Attentional Blink *Lacey Saunders, Schreiner University; Chien-Ting Wu, Schreiner University*

045-2.181 G The yersiniae response to simulated microgravity: What can we learn about bacterial virulence from a space-like environment *Sandeel Ahmed, Texas Southern University; John Eunson, Texas Southern University; Jason Rosenzweig, Texas Southern University*

045-3. Cell and Molecular Biology Poster Session

Cell and Molecular Biology

Poster Session

Participants:

045-3.182 U *Drosophila melanogaster* and the role of genetic background in eggshell phenotype *Laura Youngblood, St. Edward's University*

045-3.183 U *Escherichia. Coli* Starvation Induced L-Form Morphology and Cell Division *Eugene Johnson, Collin College*

045-3.184 NS Amounts of DNA topoisomerases induced by interleukin-2 in HuT 78 cells *Paul David Foglesong, University of the Incarnate Word; Rajeev Sajana Nair, University of the Incarnate Word; Nikita Kailash Gupta, University of the Incarnate Word*

045-3.185 U Black Currant Nectar Reduces Muscles Damage and Inflammation Following a Bout of High-Intensity Eccentric Contractions *Emily B Flieller, The University of the Incarnate Word; Alexander Hutchison, The University of the Incarnate Word*

045-3.186 U Do essential oils affect the presence of *Salmonella* in ground beef? *Olivia Gonzalez, St. Edward's University; Patricia J. Baynham, St. Edward's University*

045-3.187 U Identification and characterization of auxin signaling mutants of *Arabidopsis thaliana* *Kevin Chappell, The University of Mary Hardin-Baylor; Andrew W. Woodward, The University of Mary Hardin-Baylor*

045-3.188 U Role of leukocyte GPR120 in n-3 vs. n-6 PUFA induced atheroprotection *Nhung Phan, St. Edward's University; Swapnil Shewale, Wake Forest University; Xin Bi, Wake Forest School of Medicine; Xuewei Zhu, Wake Forest School of Medicine; Elena Boudyguina, Wake Forest School of Medicine; John Parks, Wake Forest School of Medicine*

045-3.189 G Simulated microgravity induces epigenetic changes *Nkem Azu, Texas Southern University*

045-3.190 U The effects of organophosphate pesticides on larval central nervous system development in *Drosophila melanogaster* *Michelle Victoria, St. Edward's University*

045-3.191 U The role of *orthodenticle* in early embryonic patterning in *Drosophila simulans* *Stephanie Pace, St. Edward's University*

045-3.192 U Will exposure to sub-lethal concentrations of Triclosan lead to the development of microbial tetracycline resistance? *John Watts, St. Edward's University; Lawrence Henry Edwards, St. Edward's University*

045-3.193 U β -catenin mRNA identification and analysis as a regenerative marker in *Lumbriculus variegatus Pompeyo R. Quesada, Univ. of the Incarnate Word; Robert Alan Miranda, University of the Incarnate Word; Veronica G. Martinez Acosta, Univ. of the Incarnate Word*

045-3.194 U Barcoding commercially available fish specimens for possible misrepresentation and substitution. *Hannah Zoorob, Collin College; Cristy Guizar, Collin College; Chris*

Doumen, Collin College

045-4. Chemistry and Bio-Chemistry poster session

Chemistry and Biochemistry

Poster Session

Participants:

045-4.195 U Anomalous interactions between triclosan and solvent lead to further clarification of analysis. *Jay Elliot Frey, Schreiner University; Elizabeth A Fawcett, Schreiner University; Kiley Miller, Schreiner University*

045-4.196 U Development of a ribozyme from the bI1 group II intron for use in RNA folding studies *Cullen Soares, St. Edward's University; Jeffrey Potratz, St. Edward's University*

045-4.197 U Effects of exposure to the pesticide *Imidacloprid* on growth rates of environmental bacteria *Nathan Nevitt, St. Edward's University*

045-4.198 U Purification and partial characterization of 4T1 cell cytotoxins from ginger (*Zingiber officinale*) *Trevor Burrow, Department of Chemistry, Wayland Baptist University; Jessica Rose Kenneson, Wayland Baptist University; Adam Reinhart, Wayland Baptist University; Gary O. Gray, Department of Chemistry, Wayland Baptist University*

045-4.199 U Spectral interrogation of dyes *Steven Sunday, SFASU; Alex Nelson, SFASU; Darrell Fry, Stephen F. Austin State University*

045-4.200 U Usage of tetrahedral and octahedral organotin compounds as cytotoxic materials against cancer cells *Jonathan Arturo Muniz, UTEP; Armando Varela, UTEP; Renato Aguilera, UTEP; Keith Pannell, UTEP*

Chair:

Danette Rene Vines, Schreiner University

045-5. Conservation Ecology poster session

Conservation Ecology

Poster Session

Participants:

045-5.201 U Analysis of Soil Restoration Treatments on Fungal, Eubacterial and Archaea Microbiomes: Implications for Black Capped Vireo Habitat Restoration Efforts *Samantha Parsons, St. Edward's University; Dylan Fox, St. Edward's University; Laurie Cannon, St. Edward's University; Cody Ramirez, St. Edward's University; Lisa O'Donnell, City of Austin, Balcones Canyonlands Preserve; Charles Hauser, St. Edward's University*

045-5.202 NS Carolina Wren fledgling survival in urban and forested ecosystems *Diane Neudorf, Sam Houston State Univ.; Ashley Bogrand, Sam Houston State Univ.*

045-5.203 U Models of potential geographical distribution of endemic and endangered hummingbird species in Mexico *Ana Laura Cavazos, University of Texas- Pan American; Mayra Oyervides, University of Texas-Pan American; Carlos Lara, Universidad Autónoma de Tlaxcala; Teresa Patricia Feria, University of Texas-Pan American*

045-5.204 U Invertebrate predator recognition and avoidance in the endangered Barton Springs salamander, *Eurycea sosorum* *Dominic DeSantis, Texas State University-San Marcos; Drew R Davis, University of South Dakota; Caitlin Gabor, Texas State University-San Marcos*

045-5.205 U Population density of feral hogs (*Sus scrofa*) in Hill County, Texas *Tracina Nicole Maiden, McLennan*

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U = Undergraduate student presentation/poster : G = Graduate student presentation/poster

Community College; Brittany Le, McLennan Community College; Jenni Hranek, McLennan Community College; Jennifer Benitez, McLennan Community College; Donna Hamilton, McLennan Community College; Stephanie Randell, McLennan Community College

045-5.206 **G** Shrub encroachment dynamics and the implication for a wild population of parrotlets in a tropical savanna of Venezuela. Soraya Delgado, University of Texas at Brownsville; Heather Alexander, University of Texas at Brownsville; Karl S Berg, University of Texas at Brownsville; Steve Beissinger, University of California at Berkeley

045-5.207 **U** Vehicle Induced Mortality in Raccoons (*Procyon lotor*) Michelle Ray, East Texas Baptist University; Troy A Ladine, East Texas Baptist University

045-5.208 **U** Wing Loads of the Migratory Monarch Butterfly (Lepidoptera: Danaidae) Before, During and After a Historic Texas Drought. Joshua Shayne Huckabee, Temple College; Jason Locklin, Temple College

Chair:

Chris Distel, Schreiner University

045-6. Freshwater Sciences Poster Session

Freshwater Science

Poster Session

Participants:

045-6.209 **U** Go snail! Grow: Hatchling growth of *Pomacea maculata* under predation stress Amber Danae Cochran, Southwestern University

045-6.210 **U** Go west young snails: Origins of invasive *Pomacea maculata* in Louisiana Carson Savrick, Southwestern University; Romi Burks, Southwestern University; Kenneth A Hayes, Howard University

045-6.211 **U** Like water for snails: A case study of Emerald Lake as a system invaded with apple snails (*Pomacea maculata*) Alex Petrucci, Southwestern University; Amy Elizabeth Miller, Southwestern University; Alexandria Hill, Southwestern University; Romi Burks, Southwestern University

045-6.212 **G** Mercury-contaminated riparian spiders along three east Texas rivers pose a potential risk to song birds Cleveland H Powell, Texas Christian University; Gretchen Lee Gann, Texas Christian University; Matthew Murray Chumchal, Texas Christian University; Ray Drenner, Texas Christian University

045-6.213 **NS** The Fishes of Texas Project and website: overview and future directions Dean A Hendrickson, University of Texas at Austin; Adam E Cohen, Texas Natural History Collections, University of Texas Austin; Ben Labay, Texas Natural History Collection, University of Texas Austin

Chair:

Chad Hargrave, Sam Houston State University

045-7. Mathematics Poster Session

Mathematics

Poster Session

Participants:

045-7.214 **U** Conical Helix Curves Simulating Conical Gears Cheddi Charles, UGROW at Midwestern State University

045-7.215 **U** Can't stop the madness *Ulises Zoe Jasso*, Schreiner University; Soledad Diaz, Schreiner University; Diana Laura Aguirre, Schreiner University; Kaitlyn Goertz, Schreiner University

Chair:

Elsie Mae Campbell, Angelo State University

045-8. Neuroscience Poster Session

Neuroscience

Poster Session

Participants:

045-7.216 **U** Roles of TRPA-1 and TRPV-1 channels in learning and memory in *Caenorhabditis elegans* Valaducnessa Neutzler, St. Edward's University; Fidelma A. O'Leary, St. Edward's University; He Liu, St. Edward's University

045-7.217 **U** The effects of segmental regeneration on neural morphallaxis in the aquatic oligochaete, *Lumbriculus variegatus*. Robin C. Sunsong, Univ. of the Incarnate Word; Gicel J. Aguilar, Univ. of the Incarnate Word; Janaye R. Dews, Univ. of the Incarnate Word; Veronica G. Martinez Acosta, Univ. of the Incarnate Word

045-7.218 **U** Wolf Spiders Associate Food with Predator Cues in a T-Maze Robert LeBlanc, Sul Ross University

045-7.219 **U** Spontaneous salt intake enhancement occurs even in the absence of hypertonic sodium chloride solution throughout a history of water deprivation. Ashley M Rivera, Wayland Baptist University; J Constancio, São Paulo State University; R C Vendramini, São Paulo State University; Daniela Pereira-Derderian, Wayland Baptist University

045-9. Systematics and Evolutionary Biology Poster Session

Systematics & Evolutionary Biology

Poster Session

Participants:

045-7.220 **U** An Intra-Specific Comparison of *Zygaspis quadrifrons* Grayson H Means, Sam Houston State University; Patrick J Lewis, Sam Houston State University; Cristhian Cadena, Sam Houston State University

045-7.221 **U** Cranial endocast of the amphibiaenian *Zygaspis quadrifrons* Kenneth Nobleza, Sam Houston State University; Cristhian Cadena, Sam Houston State University; Patrick J Lewis, Sam Houston State University

045-7.222 **G** Phylogeography and the origin of free-ranging elk (*Cervus elaphus*) in Texas Christopher Dale Dunn, Texas Tech University; Matthew R. Mauldin, Texas Tech University; Robert D Bradley, TEXAS TECH UNIVERSITY

045-7.223 **U** Variation of the Inner Ear of *Zygaspis* (Squamata: Amphibiaenidae) based on High-Resolution X-ray Computed Tomography Justen Deshane Adams, Sam Houston State University; Kenneth Nobleza, Sam Houston State University; Monte Thies, Sam Houston State University; Patrick J Lewis, Sam Houston State University

046. TAS Business Meeting

Texas Academy of Science Annual Meeting

Business Meeting

2:00 to 3:00 pm

Classroom Lab Building: Floor 1 - 100

047. DTS and OTE Speakers

Texas Academy of Science Annual Meeting

Plenary Session

3:00 to 4:00 pm

Classroom Lab Building: Floor 1 - 100

NS = Non-student presentation/poster : HS = High School student presentation/poster
U = Undergraduate student presentation/poster : G = Graduate student presentation/poster

048. DTS and OTE Question and Answer Session

Texas Academy of Science Annual Meeting

Plenary Session

4:00 to 4:30 pm

Classroom Lab Building: Floor 1 - 100

049. All Section Chairs Meeting

Texas Academy of Science Annual Meeting

All Section Meeting

4:30 to 5:00 pm

Classroom Lab Building: Floor 1 - 103

050. Banquet

Texas Academy of Science Annual Meeting

Special Event

5:30 to 7:00 pm

San Luis Resort Convention Center: Banquet Hall

051. Award Ceremony

Texas Academy of Science Annual Meeting

Special Event

7:00 to 10:00 pm

San Luis Resort Convention Center: Banquet Hall

ABSTRACTS FRIDAY, MARCH 7

001. Birding tours

Texas Academy of Science Annual Meeting
Special Event
8:00 to 12:00 pm

Sea Aggie Center: Foyer

For those interested in the birding trips, please RSVP before the meeting to reserve your place with the appropriate tour guide. The tours will start at their listed locations at 8am on Friday.

Participants:

Stewart Beach at East End of Broadway *Alice Anne Odonell, UTMB*

Alice Anne Odonell will be leading the East End tour starting at Stewart Beach at 8am Friday. This tour can support up to 15 people, so please RSVP with Alice prior to the meeting at email aaodonell@UTMB.edu. Participants are encouraged to be individually prepared for birding (field guides, binoculars, etc.)

Galveston Island State Park - West End Birding Trip *Richard Peake, na*

Dr. Richard Peake will lead a group of between 8-15 people around the Galveston Island State Park on Friday at 8am. Individuals interested should RSVP with Dr. Peake at rpeake1@hotmail.com. Participants should be prepared to walk and provide their own binoculars. To find GISP, take 3005 to the west end of the island, take first right after 13 mile road, Park road curves around to the nature center.

003. Harbor and Flower Garden Banks Vessel Tours

9:00 to 12:00 pm
Small Boat Basin: Docks

003-1. Harbor Tours

Texas Academy of Science Annual Meeting
Special Event

Harbor tours are offered for 36 people per trip leaving at 9am and 10 am on Friday. Individuals wishing to take a tour need to arrive at the Small Boat Basin 15-20 minutes prior to departure to complete necessary forms. Closed toe shoes are required.

003-2. Flower Garden Banks Tour

Texas Academy of Science Annual Meeting
Special Event

The MANTA is the NOAA vessel that services the Flower Garden Banks National Marine Sanctuary. This vessel berths at TAMUG at the Small Boat Basin and does not leave the docks. From this site, Captain Mike and NOAA officer Jamie Park will conduct informational tours of the Flower Gardens reef at 10, 10:30, 11, and 11:30 am on Friday. Each group can accommodate 25 people per tour, and closed-toed shoes are required. Please meet at the RV Manta on the Clipper Pier prior to one of these tour times to participate.

005. Neuroscience Session

Neuroscience
Paper Session
1:45 to 3:00 pm

Classroom Lab Building: Floor 2 - 216

Participants:

001 - Cellular and molecular correlates of nerve regeneration in a novel model system, *Lumbriculus variegatus*: A possible role for the Wnt Pathway. *Gicel J. Aguilar, Univ. of the Incarnate Word; Pompeyo R. Quesada, Univ. of the Incarnate Word; Veronica G. Martinez Acosta, Univ. of the Incarnate Word*

Mechanisms for neural regeneration is an ability that has been lost by numerous higher order phyla however, invertebrate species conserve this remarkable ability. Our laboratory has developed a novel model organism, *Lumbriculus variegatus*, to

elucidate cellular and molecular mechanisms that underlie neural regeneration. *L. variegatus*, an aquatic oligochaete worm, not only replaces missing head and tail segments (epimorphosis), but also reorganizes original worm tissue such that appropriate axial behaviors are regenerated (morphallaxis). Overall, *Lumbriculus* provides an opportunity to study regenerative mechanisms within a simple nervous system at the cellular and molecular level. Thus far, we have demonstrated that regenerating head tissue is as an important early event that is necessary for functional recovery of the nervous system (Sunsong and Martinez Acosta, 2013). Pharmacological and physical blockade of head regeneration results in inhibition of morphallactic regeneration within the original worm fragment. Thus the regenerating head may provide molecular cues that are utilized for later stages of the regenerative process. A time course of protein expression using immunoblot and immunohistochemical techniques has demonstrated the presence of a novel protein, MP66, believed to be a mannose-labeled cell adhesion molecule (Martinez et al., 2005) expressed 1-3 weeks post-amputation. More recent studies have demonstrated the expression of the developmental signaling molecule, β -catenin, in regenerating heads 3 – 24 hours post-amputation. Although the mechanism by which these proteins are involved in the regenerative process is unclear at this point, continued studies of other candidates known to interact with these two molecules will further our understanding of neural regeneration in a novel model system.

002 - Examining Temporal Relationships Between Amyloid β Accumulation, Reactive Oxygen Species Accumulation, and Loss of Neurological Function in a *C. elegans* Model of Alzheimer's Disease *Matthew Lagarde, St. Edward's University; Gilbert Rivera, St. Edward's University; Fidelma A. O'Leary, St. Edward's University*

Alzheimer's disease (AD) is characterized by a gradual loss of cognitive function accompanied by numerous neuropathologies. These include the accumulation of neurofibrillary tangles, amyloid plaques, a rise in oxidative stress levels, and neuronal death. Current AD research seeks to understand the causal relationship between amyloid accumulation and oxidative stress and whether either one acts as the primary driver of the pathological process (Zhang, et al., 2012). The nematode *C. elegans* is a useful model for neurodegenerative disease due to its short life span, simple nervous system, and the availability of disease models. In this project we examined the temporal relationship between the progression of cognitive decline, the level of reactive oxygen species (ROS), and amyloid plaque formation in an AD model expressing neuronal amyloid beta. *C. elegans* AD strain, AD control and wild type control were cultured at 20°C on solid agar medium seeded with *E. coli* OP-50. Populations were synchronized by dissolution in sodium hypochlorite bleach solution to which eggs are resistant (Stiernagle, 2006). ROS species were assayed at five ages across the lifespan using 2',7'-dichlorofluorescein-diacetate (DCFH-DA) fluorescent measurement (Wu, et al., 2006). Associative learning was assessed by training worms to associate food with a specific temperature. Trained worms were then tested for learning on a foodless temperature gradient. Data indicates that the AD model exhibits an associative learning deficit on days 7 and 9 which precedes abnormal oxidative stress levels on day 9. This may suggest that oxidative stress does not directly contribute to cognitive dysfunction.

003 - Type-2 diabetes-induced inflammation and apoptosis in retina and lateral geniculate nucleus *Carlos A. Garcia, University of the Incarnate Word; Maia C. Bland, University of the Incarnate Word; Muraya Gonzalez, University of the Incarnate Word*

In humans, diabetic retinopathy (DR) is the most common complication of type-2 diabetes mellitus (T2D) and is the leading cause of new blindness. The lateral geniculate nucleus (LGN), the primary relay center between the retina and the primary visual cortex, is a candidate for neuronal dysfunction in DR. The goal of this study was to examine DR inflammation and its

influence on neuroretinal apoptosis in Zucker Diabetic Fatty (ZDF), a rat model of T2D. Rats were divided into two groups: control, and diabetic (ZDF). The protein expression of the cytokines tumor necrosis factor- α (TNF- α), interleukin-1 beta (IL)-1 β , and IL-10, from the retina and LGN, in ZDF, and control rats was measured using enzyme-linked immunosorbent assays (ELISAs). The concentrations of the B-cell lymphoma 2 (Bcl 2), Bcl-2 associated death promoter (BAD), and Caspase-3, in retina and LGN were quantified by immunoblotting. The results indicate inflammation is occurring with significant ($p < 0.05$) increases in the pro-inflammatory cytokine TNF- α (739 \pm 48 vs. 518 \pm 32 ng/ml; 3161 \pm 51 vs. 2794 \pm 106 ng/ml) and IL-1 β (2223 \pm 45 vs. 2021 \pm 57 ng/ml; 938 \pm 74 vs. 698 \pm 32 ng/ml) and decreases in anti-inflammatory cytokine IL-10 (155 \pm 4 vs. 202 \pm 8 ng/ml; 151 \pm 8 vs 249 \pm 19 ng/ml) in the diabetic retina and LGN, respectively, and demonstrates the pro-apoptotic BAD and Caspase-3 significantly increased while the anti-apoptotic Bcl-2 significantly decreased. The results provide evidence that hyperglycemia in T2D causes visual system damage through neuroretinal pathways located in the mammalian LGN.

004 - Memory improvement using near-infrared lasers and LEDs that up-regulate cytochrome oxidase *Francisco Gonzalez-Lima, University of Texas at Austin; Douglas W. Barrett, University of Texas at Austin*

Memory retention has been improved pharmacologically by increasing neuronal mitochondrial respiration with methylene blue, a drug that at low doses donates electrons to the respiratory enzyme cytochrome oxidase. Near-infrared light may also stimulate mitochondrial respiration by donating photons to cytochrome oxidase because cytochrome oxidase is the main acceptor of photons from red-to-near-infrared light in neurons. Low-level light/laser therapy (LLLT) with near-infrared light is a novel intervention shown to regulate neuronal function in cell cultures, animal models, and clinical conditions. Light that intersects with the absorption spectrum of cytochrome oxidase was applied to rats using LEDs, or applied to the forehead of humans with a laser diode that maximizes tissue penetration and has been used in humans for other indications. We found that LLLT enhanced cortical oxygen consumption (measured in vivo with fluorescence-quenching oxygen probe and near-infrared spectroscopy) and cytochrome oxidase (measured with enzyme spectrophotometry and histochemistry) in both rat and human prefrontal cortex. LLLT also improved prefrontal cortex-related types of memory, such as extinction and working memory. LLLT after fear extinction prevented fear renewal in rats. Working memory (delayed-match-to-sample task) showed also a significant improvement in LLLT vs. control groups of people as measured by memory retrieval latency and number of correct trials. These studies suggest that transcranial neural stimulation may be used as a non-invasive and efficacious approach to increase neuronal mitochondrial respiration functions related to improvement of prefrontal memory functions. This innovative approach may be applied as a new non-invasive, memory-improving intervention in animals and humans.

006. Cell and Molecular Biology I

Cell and Molecular Biology

Paper Session

2:00 to 3:00 pm

Classroom Lab Building: Floor 1 - 103

Participants:

005 - Blood root (*Sanguinaria Canadensis*) disrupts the cell cycle in 4T1 murine breast cancer cells *Thomas Evan McElwain, Wayland Baptist University; Sarah Christine Kelly, Wayland Baptist University; Jarrett H. Ross, Wayland Baptist University; Libby M. Saultz, Wayland Baptist University; Gary O. Gray, Department of Chemistry, Wayland Baptist University; Adam Reinhart, Wayland Baptist University*

Breast cancer is the second leading cause of cancer related deaths

among females in the United States. For many years, traditional methods of treatment, such as surgery and various forms of therapy, have been viewed as the only form of cancer treatment available. However, in recent years, an increasing number of people have been turning to medicinal plants as a possible option for cancer treatment. In previous studies, we have demonstrated that ethanolic extracts of several medicinal plants were found to be cytotoxic on the 4T1 murine breast cancer cell line. Furthermore, we have shown that among others, blood root treatment induces 4T1 cells to die through apoptosis. Often, cells undergoing apoptosis also experience disruption of the cell cycle. In this study, we have sought to understand the effects of blood root on the cell cycle in 4T1 cells. We have used western blots to examine levels of cell cycle regulatory proteins to determine which regulatory system may be disrupted. We compared cyclin D1 and cyclin D3 to actin protein expression through western blot analysis and found a decrease in protein for both cases when compared to our actin control. We have also utilized flow cytometry to determine where in the cell cycle the cells are being arrested.

006 - Ginger root (*Zingiber officinale*) disrupts the cell cycle in 4T1 murine breast cancer cells *Sarah Christine Kelly, Wayland Baptist University; Thomas Evan McElwain, Wayland Baptist University; Jarrett H. Ross, Wayland Baptist University; Libby M. Saultz, Wayland Baptist University; Gary O. Gray, Department of Chemistry, Wayland Baptist University; Adam Reinhart, Wayland Baptist University*

Breast cancer is the second leading cause of cancer related deaths among females in the United States. For many years, traditional methods of treatment, such as surgery and various forms of therapy, have been viewed as invasive and the only form of cancer treatment available. In recent years, medicinal plants have been studied as a possible treatment for various cancers. In previous studies, we have demonstrated that ethanolic extracts of several medicinal plants were found to be cytotoxic on the 4T1 murine breast cancer cell line. Furthermore, we have shown that among others, ginger root treatments induce 4T1 cells to die through apoptosis. Often, cells undergoing apoptosis also experience disruption of the cell cycle. In this study, we have sought to understand the effects of ginger root on the cell cycle in 4T1 cells. We have used western blots to examine levels of cell cycle regulatory proteins such as, cyclin-dependent kinases, cyclin D1 and cyclin D3 to determine which cell cycle regulatory system may be disrupted. We have found that cyclin D1 protein levels are decreased upon treatment with ginger root. We have also utilized flow cytometry to determine where in the cell cycle the cells are being arrested.

007 - Investigating essential amino acid metabolism using isobutyric acid-resistant mutants of *Arabidopsis thaliana* *Erica Marina Richardson, University of Mary Hardin-Baylor; Andrew W. Woodward, The University of Mary Hardin-Baylor*

Isobutyric acid is a breakdown product of branched-chain amino acid metabolism. Although branched-chain amino acids are essential amino acids that the human body requires from dietary sources such as plants, the pathways responsible for branched-chain amino acid metabolism in plants are poorly understood. Through the isolation of *Arabidopsis thaliana* mutants, we hope to identify genes necessary for plants to degrade and respond to isobutyric acid. By growing seeds aseptically on medium supplemented with varying amounts of isobutyric acid, I identified potential mutants in *A. thaliana* that appear to be resistant to isobutyric acid-repressed root elongation. These putative isobutyric acid-resistant (ISA) mutants were then moved to soil to allow for seed production. We will use these findings and putative mutants to further study the metabolism and toxicity of isobutyric acid in *Arabidopsis*. Through these investigations, we will better understand essential amino acid metabolism in hopes of alleviating malnutrition.

008 - Survey for the presence of leishmaniasis in canines and felids in Travis County, Texas *Erik Jordan Escobar, St. Edward's University; Charles Hauser, St. Edward's University; Monica Swartz, Wild Basin Wilderness Preserve, St. Edward's University*

Leishmaniasis, caused by protozoan parasites of the genus *Leishmania*, is a zoonotic disease transmitted between humans and animals by an insect vector, most often a sand fly (*Phlebotomus, Lutzomyia*). Though this disease is widely considered to be endemic only in tropical or sub-tropical regions, there has been recent concern that some non-native species of the parasite have become endemic in the U.S. or that native species are more widespread than previously believed. The perceived absence of *Leishmania* in the U.S. may be the result of lacking widespread surveillance and identification of the parasite due to the rarity of endemic human cases. The aim of this study was to survey populations of feral cats and dogs, that may have come in contact with infected flies or other infected animals in Travis County, for the presence of *Leishmania*. PCR analysis using *Leishmania*-specific primers was employed to screen blood samples, collected by certified veterinary technicians at the Austin Human Society, for *Leishmania* sp. in DNA. Additionally, primers to detect glyceraldehyde 3-phosphate dehydrogenase (GAPDH) genes for canines and felids were employed as controls for sample DNA isolation. Amplification of leishmanial kDNA using *Leishmania*-specific primers served as positive controls. An initial survey of less than one hundred feral cats and dogs for the disease resulted in three putative positive samples that upon retesting scored negative for the presence of *Leishmania* sp.. Currently, additional samples are being screened with future research to include samples to be collected in known endemic areas (Rio Grande Valley).

007. Terrestrial Ecology and Management I

Terrestrial Ecology and Management

Paper Session

2:00 to 3:00 pm

Ocean & Coastal Studies Building: Floor 1 - 142

Participants:

009 - Function and Structure of Song Delivered by Male Carolina Wrens (*Thryothorus ludovicianus*) During Nestling Provisioning in Urban and Rural Habitats *Claire Randall, Sam Houston State University; Diane Neudorf, Sam Houston State Univ.*

Male Carolina Wrens often sing at the nest prior to feeding their nestlings. We tested the hypotheses that male song at the nest serves as a communication tool to both the female and also the nestlings. We quantified the incidence of male song during nestling provisioning by video recording and direct observation in both urban and rural environments. We observed female responses and recorded nestling begging responses to male song at the nest to test our hypotheses. We used Raven Sound Analysis software to compare the structure of an individual male's song given at the nest versus under other circumstances. We will discuss the possible functions of male song during provisioning and variation in male song usage in both an urban and rural habitat.

010 - Habitat Use and Activity Patterns of Western Screech-Owls (*Megascops kennicottii*) in the Davis Mountains of West Texas *Corin M Olivas, Sul Ross State University; Natividad Sandoval, Wayland Baptist University; Andrew Kasner, Wayland Baptist University; Chris M Rützi, Sul Ross State University*

Western Screech-Owls (*Megascops kennicottii*) are small, nocturnal owls that occur year-round throughout most of the Trans-Pecos region in West Texas, associated with deciduous woodlands and riparian habitats. From spring and summer 2013, radio-telemetry and call-count surveys were used in order to

determine screech-owl habitat use and characteristics of occupied sites. We triangulated marked birds at night to determine habitat, and during the day to ascertain roost sites, until the transmitter fell off of the bird. The amount of locations and triangulation efforts were limited due to transmitter removal by owls. Movement distances and habitat characteristics at capture sites were recorded, and we performed a vegetation analysis on both roost sites and nighttime active sites. Six owls were marked during the study, and we found that 3 of 6 locations were confirmed as daytime roosting sites. The other 3 were assumed roosting sites due to the fact that the owls seemed to be removing the transmitters at roost sites. The closest distance from a capture site was 73.37m, while the farthest distance 874.33m. Elevation ranged from 1750m to 2007m, and the average elevation at final transmitter locations was 1921m. Owls and transmitters were discovered in dense juniper-oak mts on north-facing slopes, indicating they prefer dense, short closed canopy areas for roosting. Roost site habitat consisted of primarily *Quercus* species, *Pinus cembroides*, and *Juniperus deppeana*, with an average of 41% understory cover. Nighttime sites were characterized by more open, juniper-pine tree stands with an average of 54% understory cover, and occurred primarily on north-facing slopes with an average elevation of 1807m.

011 - Nesting associations of Altamira Orioles and other birds in the Yucatan Peninsula of Mexico *Timothy Brush, University of Texas-Pan American*

The nesting associations of Altamira Orioles, Rose-throated Becards, and Orange Orioles are thought to reduce nest predation in the tropics. However, such associations have not been quantified. Data gathered in 2011 and 2013 from Yucatan state show that 85% of 187 Rose-throated Becard nests and 89% of 62 Orange Oriole nests were within 10 m of Altamira Oriole nests, within which most aggressive responses occur. Distances to Altamira Oriole nests averaged 2.92 m and 3.24 m, respectively. 43% of 265 Altamira Oriole nests were within 10 m of other species. 19% of Yellow-olive Flycatcher nests were within 10 m of Altamira Oriole nests, suggesting the absence of an active nesting association. The larger and more aggressive Altamira Oriole may drive off predators and brood parasites from nests within 10 m of its own nest, but this needs to be quantified.

012 - Herpetofaunal diversity and abundance among different aged burns in a shinnery oak stand *Jacob Kemmer, Wayland Baptist University; Andrew Kasner, Wayland Baptist University*

The objective of this study was to determine the effects of fire on reptile diversity and abundance in a sand shinnery oak stand located in Yoakum and Terry Counties in the Southern High Plains of Texas. Herpetofauna was sampled from June-October 2013 in 3 sites of different ages since wildfire (4-yr. post-burn, 3-yr. post burn, and 2-yr. post burn) and one unburned site on the Nature Conservancy's Yoakum Dunes Preserve. Vegetation height and ground cover (percent grasses, forbs, shrubs, plant litter, and bare ground) were recorded to determine differences in vegetation and structural characteristics among the four sites. A total of 58 individual reptiles were captured consisting of five lizard species and four snake species. Species richness was lowest (n=1) in the 3-yr. post-burn compared to the unburned site (n=6), 2-yr. post-burn (n=5), and 4-yr. post-burn (n=4). Body condition of adult and juvenile *Sceloporus undulatus* (most widespread species) did not differ between the burned and unburned sites. Shannon-Weaver Index of Species Diversity showed that the unburned site had the highest diversity of reptiles ($H' = 4.58$) compared to the burned sites ($H' < 3.47$). Jaccard's Community Coefficient of Similarity showed that the 3-yr. post-burn had the lowest similarity (CCJ < 0.25) to other sites, and the highest similarity (CCJ = 0.5) was between the 2- and 4-yr. post-burns. Live vegetation did not differ among sites, but the 2-yr. post-burn had the highest mean coverage of bare ground (mean = 0.54), lowest amount of litter (mean = 0.09) and vegetation height (mean = 20.7 cm) compared to other sites. The presence of a food source (harvester ants of the genus *Pogonomyrmex*, other

insects, and rodents) and vegetation characteristics may explain the diversity of reptiles at different sites on the Preserve. The site with the lowest reptile diversity (3-yr post-burn) had no incidental captures of harvester ants during the study, while other sites had harvester ants present. Juveniles of *Eumeces obsoletus* were only captured in the 2 yr. post-burn, and *Cnemidophorus sexlineatus viridis* was captured only in burned areas.

Phrynosoma cornutum was captured mostly in the unburned site, and snakes were captured in the unburned and older aged burn.

008. Science Education I

Science Education

Paper Session

2:00 to 3:00 pm

Powell Marine Engineering Complex: Floor 1 - 146

Participants:

013 - Causal Loop of Intensive Sustainable Professional

Development: The Importance of the Relationship Between Facilitators and Teachers and Among Teachers *Michele Mann, University of Texas at Austin; Jair Aguilar, University of Texas at Austin; Wan Sim Lim, University of Texas at Austin*

The principal purpose of this theoretical study was to develop and evaluate a causal loop of intensive sustainable professional development. To our knowledge, cohort relationships between teachers and between teachers and facilitators have not been examined in the context of professional development. Through literature review and interviews with participants of a large professional development cohort we have determined latent factors of this causal loop. The causal loop proposed that an essential element in professional development might not be the subject matter but instead the relationships that are built within the networks from intensive sustainable professional development. The creation of this support network is a catalyst for all the other reactions of intensive sustainable professional development.

014 - Engaging and Retaining Undergraduate Students through Mentored Research *Sofia Caylor, Sul Ross State University*

Sul Ross State University McNair students conducting research in science, technology, engineering, and mathematical related fields have an enhanced research experience through the Adelante Tejas project. Adelante Tejas is a Title V funded cooperative partnership between San Antonio College and Sul Ross State University designed to strengthen Science, Technology, Engineering, and Mathematics education at both institutions. The intent of the project is to advance student retention, undergraduate success, and prepare students for post associates and baccalaureate academic and professional success through strategic improvements to laboratory and pedagogical conditions. Access to industry standard instrumentation combined with the research/inquiry experience furthers these goals. Also through collaboration with the McNair Scholars program the Adelante Tejas project is significantly impacting access to for under-represented students in the sciences. Students undertaking McNair research projects using Adelante Tejas-acquired scientific instruments build confidence through 1:1 mentoring with faculty advisers on undergraduate research projects where they learn analytic methods, experience laboratory training, and conduct their own research, ultimately impacting post-degree academic and professional outcomes. For instance an undergraduate's McNair project "Survey of Mafic Rocks of the Big Bend" examines, in depth, petrology, mineralogy and geochemistry of magmatic rocks using a McNair program grant and the analytic equipment provided by Adelante Tejas. This equipment includes a Scanning Electron microscope with EDXRF capabilities. The student undertaking this project gains early exposure to the research process in preparation for future academic and professional accomplishments.

015 - Self-efficacy, self-advocacy and first year biology majors *Christopher Golubski, University of Texas at Austin; Michele Mann, University of Texas at Austin*

This study is examining first-year biology majors in their first for majors course. We have been following two cohorts examining their scores on the Motivated Strategies for Learning Questionnaire (MSLQ) and their GPA. Using the MSLQ, self-efficacy was evaluated at the beginning and end of the semester in an entry-level biology course for biology majors. There was a significant difference in self-efficacy from the pretest to the posttest on two questions. The students' self-efficacy significantly decreased on such questions "I expect to do well in this biology class" ($p = .024$) and "Considering the difficulty of this biology course, the teacher, and my skills, I think I will do well in this class" ($p = .033$). Moreover, even though the differences in the other six questions were not significant, they showed a downward trend between the beginning of the course and the end of the course in regard to student self-efficacy. There was also significant positive difference between the pretest and post test scores on the question "I ask the instructor to clarify biology concepts I don't understand well" ($p < .01$). It appears that students have an inflated perception of their skill level in college level STEM classes. Helping students develop metacognitive skills and getting students involved in small groups might help them transition from a high school setting to a competitive college environment will help retain valuable students in STEM majors.

016 - Research Supported Rubric for Selection of Professional Development Programs *Michele Mann, University of Texas at Austin*

This paper presents an adaptable, research-based rubric, designed to select a program based on its worth to meet the specific needs of an organization. Professional development is at the center of school improvement. While there is much research on what constitutes effective professional development there is not a stand-alone rubric that can easily be used by practitioners to select a program to meet their specific needs. The rubric was created as a combination of research from multiple sources using characteristics of effective professional development programs. This instrument will give the administrator specific information about program strengths and where augmentation is needed in a user-friendly format.

009. Environmental Science I

Environmental Science

Paper Session

2:00 to 3:00 pm

Powell Marine Engineering Complex: Floor 2 - 243

Participants:

017 - Analysis of Urban sprawl and its effect on Urban Environmental characteristics using spectral reflectance and Landsat Data *Gilbert Saah, Texas Southern University*

Urban landscapes are a complex combination of buildings, roads, pavements, roofs, vegetation, soil, and water, each of which exhibits unique spectral reflectance and thermal properties. To understand the interactions and impact of these heterogeneous urban landscapes on their environmental surroundings, more precise urban mapping techniques are of essential importance. Several studies have demonstrated that spectral reflectance characteristics (in the range of 350-2500 nm) of the different urban landscapes are varied and distinctly different. However the application of this spectral information to map and accurately classify the urban features at local, regional and global scales has rarely been explored. The goal of this research project is to investigate the effects of urban landscape features on the local and regional environmental quality in Houston, TX. The specific objectives of the study are, 1) to develop a spectral library of the urban landscape features, 2) Identify and analyze the spectral characteristics of the urban features, 3) Use of multi spectral and multi temporal Landsat imagery to accurately classify and map

the urban features and 4) Identify and map the effects of urban sprawl on environmental quality.

018 - Evaluation of *Prymnesium parvum* fatty acid amide accumulation and their contribution to fish mortality events
Sean O'Mara, Texas A&M University Corpus Christi

Prymnesium parvum, a haptophyte, has been a reported HAB species for nearly a century, including losses of over 30 million fish in Texas alone resulting in economic losses surpassing \$10 million USD. Previous attempts to determine factors which influence *P. parvum* growth and toxin production found poor correlations, possibly due to the incomplete identification of *P. parvum* toxic metabolites. Field samples from Texas water bodies experiencing fish mortality and elevated *P. parvum* levels were used to determine a cell density to FAA relationship. Three unialgal cultures and 3 nutrient treatments were used to assess growth rate, photosynthetic efficiency, and FAA accumulation as a function of N & P availability. This study confirms the presence of FAA in Texas *P. parvum* bloom samples and cultured isolates, with a high correlation ($R^2=0.66$) between *P. parvum* cell density and FAA concentration. There was a significant difference in doublings per day (k) between strains ($p<.001$), and between treatments ($p<.05$) for one strain. Photosynthetic efficiency was highest under control conditions. FAA accumulation analysis is ongoing. FAA were present in all field samples and cultures tested, confirming the importance of FAA in fish mortality events. Increasing FAA accumulation under nutrient limited growth may be a survival mechanism employed by *P. parvum*; diverting energy from growth processes to toxin production may cause fish mortality, thereby releasing nutrients into the water. This hypothesis is supported by the majority of reported Texas *P. parvum* blooms occurring during the winter months when decreased run-off can lead to nutrient limitation.

019 - Identification and toxicity assessment of a new to science cyanobacterial toxin *I-Shuo Huang, Texas A&M University-Corpus Christi*

Cyanobacterial toxins are best known in freshwater systems, with only three toxins known from marine systems. It is likely that many other marine cyanobacterial toxins are undescribed. A marine *Leptolyngbya* sp. was isolated from an aquatic animal rearing facility having mysid mortality events. The morphology of the *Leptolyngbya* isolate did not match other known marine taxa. Molecular phylogenetic analysis via morphology (SEM, TEM) has confirmed its uniqueness. Unialgal cultures were used to produce sufficient material to isolate the toxin. Isolation of the unknown toxin was accomplished by bioassay-guided fractionation using HPLC-MS. The toxin has a unique mass-to-charge ratio of 475.3 amu that does not match any known toxins. Structural confirmation is being performed using TOF-MS and NMR. Toxicity of fish, mysids, and copepods occur after toxin exposure. LD₅₀ values of fish, mysids, copepods, mammalian cell lines and algae were determined. The LD₅₀ values are helpful for understanding the species response once exposed to the toxin and the relative potency of the toxin compared to other toxins. Toxicity of this novel toxin and other known toxin were compared to provide comparative information on relative potency.

020 - Phosphorus Retention in Streambank Sediment
Georgiana Hudson, Tarleton State University

The Bosque River and its tributaries feed Lake Waco, which serves as a major drinking water source for the City of Waco. Overabundance of nutrients in the northern portions of the Bosque River watershed has led to eutrophication and water quality issues for Lake Waco. Erosion and transport of sediment bound phosphorus from streambanks can provide a major source of bioavailable phosphorus to aquatic systems (Hubbard et al 2003). Thompson and McFarland (2010) found high total P concentrations in streambank sediments in a small tributary of the Bosque River, Scarborough Creek. Their study only involved a few samples; however, additional work by two students corroborated these findings. One question which arose from the

previous studies relates to the concentrations of P in the watershed. Does the accumulation of P in streambanks occur in other watersheds that have lower P concentrations in the water? The overall goal of this research was to see if the same influx of total, labile and extractable P may be seen in a similar-sized stream, within a neighboring watershed that had a lower ambient P load, the Paluxy River watershed. Vertical and horizontal cores have been collected at each of the 3 sites along the Paluxy River tributary. Total P, labile P and water extractable P concentrations were determined on all of the segmented cores. There appeared to be an overall influx of phosphorus into the bank, with P concentrations dominantly decreasing with core depth.

011. Cell and Molecular Biology II

Cell and Molecular Biology

Paper Session

3:30 to 5:00 pm

Classroom Lab Building: Floor 1 - 103

Participants:

021 - The roles of SOX9 and SOX11 in skin carcinoma
Derek Thomas Draper, Schreiner University

Sry-related HMG-box transcription factors, also known as SOX factors, have been shown to be involved in tumorigenesis. This research aimed to uncover the role(s) of SOX9 and SOX11 specifically in skin tumorigenesis. For SOX9, immunofluorescent staining on cryosections of both control and Sox9-induced skin was performed and a comparison was made for the distribution of skin markers. Also, an in vitro examination of shRNA-mediated Sox9 knockdown in SCC cells was performed. For SOX11, DMBA/TPA induced skin tumors were subjected to histological analysis by H&E staining and immunofluorescent staining. SOX9 results showed an overall decreased expression for hair follicle markers compared to the staining from active hair follicles as control. These results suggest that Sox9 is involved in the proliferation of keratinocytes in the basal layer of skin. Further, the in vitro examination did not show a repressed cell growth when Sox9 is silenced because there may be other cellular pathways, such as, cell apoptosis that might be involved. SOX11 results showed hyper-proliferation of sebocytes, the major cell type in the sebaceous gland, in most of SOX11-induced tumors. Thus, Sox11 may be a causative agent of sebaceous tumors in addition to the typical papilloma and its progression to SCC. Further research can be performed to confirm this result and understand the mechanism of this effect.

022 - Will exposure to sub-lethal concentrations of Triclosan lead to the development of microbial tetracycline resistance?

Lawrence Henry Edwards, St. Edward's University; John Watts, St. Edward's University

Triclosan has been shown to disrupt both gram positive and gram negative bacteria cell wall fatty acid synthesis in *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa*. Some bacteria become resistant to Triclosan by upregulating efflux pumps as found in some *S. aureus* and *E. coli* strains. *fabI* overexpression can also reduce the effectiveness of Triclosan. We hypothesized that exposure to Triclosan in sub lethal concentrations will cause tetracycline resistance in *Staphylococcus aureus*, *Escherichia coli*, and *Pseudomonas aeruginosa*. A minimum inhibitory concentration (M.I.C.) test was first performed using >97% Irgasan DP-300. To expose the strains to sub-lethal concentration of Triclosan over time samples were incubated at these concentrations and an aliquot was streaked onto BHI plates every 24 hours for 7 days. One colony was isolated from each sample and incubated overnight in 5ml of BHI broth. BHI agar was made with varying concentrations of tetracycline from 512µg/ml-1µg/ml. Plates were then observed for sensitivity to the various concentrations. The wild-type bacterial strains showed no growth on any of the concentrations of tetracycline but did grow on the non-tetracycline control plate. All experimental strains showed growth on concentration ranges from 16.0µg/ml-1.0µg/ml but were inhibited above this range. This result was surprising since resistance was detected after only

24 hours of sub-lethal Triclosan exposure and this resistance did not appear to increase. In the future, we would like to determine if this resistance is due to the upregulation of efflux pumps, the mutation of *fabI* or some other mechanism.

023 - Isolating the Impact of Individual Parkinson's Disease Pathologies on Voluntary Motor Control in *C. elegans*
Cassandra Boduch, St. Edward's University; Fidelma A. O'Leary, St. Edward's University

Parkinson's disease (PD) is a progressive-neurodegenerative disorder characterized by the loss of dopaminergic neurons, diminished motor-control, and aggregation of α -synuclein (AS) protein into Lewy bodies. Transgenic PD strains of *C. elegans*, NL5901 and CB1112, are useful models to examine progressive degeneration of locomotion over the lifespan. Both strains mimic individual human PD pathologies: NL5901 expresses human α -synuclein (AS); CB1112 is deficient in tyrosine-hydroxylase, therefore incapable of synthesizing dopamine. Additionally, RNAi knockdowns (KD) of HSP-90, confirmed to increase aggregations, were used to test the impact of AS aggregations on locomotive-control. Both PD strains and KD were continuously treated with dopamine-agonist and dopamine-reuptake-inhibitor in order to strengthen dopaminergic signaling. Voluntary motor control for each group was determined by a locomotive control index (LCI), computed daily for 9 days. The LCI data suggest the expression of AS alone significantly diminished locomotive control in *C. elegans* compared to N2-wt (t-test, $p < 0.001$). With KD the resulting increased AS aggregation further decreased LCI compared to N2 (t-test, $p < 0.001$). The data also show a significant reduction of the LCI in the dopamine-deficient strain compared to N2 (t-test, $p < 0.001$). Additionally across all strains, motor-deficits progressed with age, possibly due to an increasing AS load, or to degenerating elements in the dopaminergic circuit. When strains were treated from birth to enhance dopaminergic signaling, the LCI rose for all strains. This suggests that strengthening the dopaminergic-pathway was enough to partially restore locomotive control. Isolation of each of the pathologies of PD has provided insight into their individual impact on locomotive control in *C. elegans*.

012. Systematics and Evolutionary Biology I

Systematics & Evolutionary Biology

Paper Session

3:30 to 5:00 pm

Ocean & Coastal Studies Building: Floor 1 - 141

Participants:

024 - A re-examination of the fossil land snails (Gastropoda: Pulmonata) from the Devil's Graveyard Formation of west Texas using CT scanning
Mary Jones, Angelo State University; Ned Strenth, Angelo State University; Alfonso Correa-Sandoval, Instituto Tecnológico de Cd. Victoria, Tamaulipas, Mexico

Previous examination of specimens of the fossil land snail *Lysinoe breedlovei* from the Colmena Tuff (Eocene) in Presidio County of west Texas revealed considerable morphological variation within the type series. In an effort to quantify a more comprehensive assessment of this variation, this current study examined a series of fossils from the Devil's Graveyard Formation (DGF). These localities are not only relatively close geographically (approximately 105 km) but the formations also share a similar geological age and have correlating vertebrate fauna. Material from the DGF was referred to *Lysinoe breedlovei* in the original description of the species. Recent field collections from the DGF have yielded additional specimens. These new specimens were examined using standard external measurements as well as CT scanning. An analysis of variance showed significant variation between the two groups. Results of this study do not support the referral status of the DGF material to the fossil species *Lysinoe breedlovei* and further question the degree of variation within the type series.

025 - Beyond ancestors, *Gekko gekko* shows more maturity than expected
Aurelia Mapps, Sam Houston State University; Juan D Daza, Sam Houston State University; Patrick J Lewis, Sam Houston State University; Monte Thies, Sam Houston State University

Traditionally geckos are conceived as exemplar animals of paedomorphic characteristics, meaning they retain juvenile traits after maturity. Due to this generalization, the contrasting process, peramorphosis, has not yet been considered as an important factor defining their morphology. In peramorphic individuals, the descendant morphology develops "beyond" that of the ancestor. Here we present results from an anatomical study of the large size of Tokay gecko (*Gekko gekko*); our results suggest that during maturity, this species undergoes peramorphosis. Although this species has been extensively studied in the past, many of the previous studies have overlooked some of these morphological features. Our study begins to fulfill this insufficiency of morphological data. Our data consists of high resolution x-ray computed tomography (HXRCT) for two specimens and digital photographs from skeletonized specimens from herpetological collections. HXRCT data provides exceptional resolution of minute details that can be difficult to discern using traditional methods. The peramorphic traits identified for this species are concentrated in the braincase (including the brain roofing elements) and the palate. These traits include fused parietal bones, an extensively developed processus ascendens tectum synoticum, and the development of a tongue and groove suture between the ectopterygoid and the pterygoid. All these novel peramorphic characters might have developed in this species to fulfill its constructional demands for feeding large prey such as small vertebrates.

026 - Dominance hierarchies, social subjugation, and female reproductive success in a sex-role reversed fish (*Sygnathus scovelli*)
Janae Ariel Sasha Wallace, St. Edward's University; Tamara Fraker, St. Edward's University; Sunny Scobell, Brooklyn College; Raelynn Deaton Haynes, St. Edward's University

Dominance hierarchies result in dominant and subordinate individuals, often referred to as social subjugation. Such subjugation is brought about by intra-sexual competition via aggression. Competition in females often results in subjugation, or the "shutting down" of reproduction in one female, and in turn, increased investment into growth. Thus, social subjugation can have direct consequences for female reproductive success. Here, we investigated social subjugation over time in a sex-role reversed mating system, *Sygnathus scovelli* (gulf pipefish), where females compete strongly for males. We hypothesized that social subjugation (through aggressive competition) can drive the formation of dominance hierarchies that, in turn, causing a trade-off in growth and reproduction. Gulf pipefish were collected from seagrass beds around Port Aransas, Texas, and returned to the laboratory where behavioral assays were performed. Thus far, our results suggest that: 1) aggression is directly correlated to a female's social status with behaviors such as the temporary melanistic display most heavily influencing the establishment of dominant/subordinate status; 2) morphometric features of females such as standard and maximum body depth influence a female's social status; 3) dominance likely is established on the first day of interactions, with no change within a single female's behavior over time; 4) there is a trend of decreased fecundity for both dominant and subordinate females post-competition - with the subordinate females more negatively affected than the dominant. Overall, our data suggest that females in sex role reversed species form dominance hierarchies that can significantly influence female fitness.

027 - Male mosquitofish, but not guppies, alter mating behavior in response to risk of sperm competition
Julian Copado, St. Edward's University; Raelynn Deaton Haynes, St. Edward's University

We tested the hypothesis that males alter mating behaviors according to risk of sperm competition in two species of livebearing fishes that differ in mating strategies: coercive mosquitofish (*Gambusia affinis*) and courting guppies (*Poecilia reticulata*). Two previous studies by Deaton Haynes et al. found that male mosquitofish prefer to mate with females that minimize their risk of sperm competition. What was surprising about their results is that males altered their behaviors (mated less often with field caught females that were mated with an additional male) even in the absence of any visual cues of their competitors. Extending on these findings, we sought to further investigate this hypothesis, while expanding upon the risk of sperm competition treatments (increasing sperm competition). In a series of two behavioral experiments, we show that 1) the propensity for male mosquitofish to mate more often with females that present lower risk of sperm competition is repeatable; 2) male mosquitofish prefer large females (field caught over virgin), but mate more often with field caught females that present lower risk of sperm competition (those mated with fewer males); and 3) guppy males did not alter their behaviors according to risk of sperm competition. Our findings indicate that selection on coercive males to detect risk of sperm competition may be stronger than that on courting males that rely heavily on female choice and receptivity. Future studies will focus on understanding mechanisms by which males can detect risk of sperm competition in coercive fishes.

- 028 - Maturation-dependent sperm storage in livebearing fishes
Charline Valeria Mejia, St. Edward's University; Raelynn Deaton Haynes, St. Edward's University; Sean Maguire, University of Texas

Female livebearing fishes of the family Poeciliidae have the ability to store sperm for long periods of time. Sperm storage is most common in polyandrous females and likely evolved as an adaptation to preferentially choose sperm. However, it is unknown at what point during development females begin to store sperm. It is also unknown at what stage during maturation, sperm storage capabilities are maximized. Currently, I am testing the hypotheses that females can begin to store sperm before reaching sexual maturity and that sperm storage capabilities are a function of age and size. Female *Poecilia reticulata* and *Gambusia affinis* are being used for this study. Currently, very little data on maturation stages is readily available; therefore data collected from dissections of fish was used to assign size classes at different sexual maturation stages. These size classes are representative of maturation stages from immature gonads to ovary development, brood development and senescence. Virgin females in each class are mated with males, isolated and monitored for pregnancy. Age and size of females is recorded along with number of offspring per life span. Reproductive organs of some females of each size class are being sectioned for observation to ensure presence of sperm in reproductive tract of immature females. Number of sperm cells present will also be counted on hemocytometer. Thus far, females under 15mm have been observed to have storage abilities, which is much smaller than was previously thought to be the size and age of sexual maturity.

- 029 - Morphometric predictors of female reproductive output in a sex role reversed fish
Mark Alex Greco, St. Edward's University; Tamara Fraker, St. Edward's University; April Navarro, St. Edward's University; Sunny Scobell, Brooklyn College; Janaee Ariel Sasha Wallace, St. Edward's University; Raelynn Deaton Haynes, St. Edward's University

In sex role reversed species, such as syngnathid fishes, males are the limiting sex. As a result, females show elaborate courtship and display behaviors, and possess ornaments such as iridescent lateral bars to attract mates. Males prefer larger females with higher bar numbers and a larger total bar area, but it remains unknown whether other female characters influence this mating system. Using a multivariate approach, this study will characterize several additional, but less explored, morphological characters of female pipefish as potential predictors of female

reproductive investment. To date, 150 mature female gulf pipefish have been dissected, measured, photographed, and weighed. In addition, ovaries have been removed and weighed to obtain a gonadosomatic index (a measure of reproductive investment). ImageJ was used to assess 34 phenotypic characters that may be indicators of reproductive investment (e.g. number of bars, iridescence, size and area of dorsal fin, body depth and length, among others). Using these data, we aim to determine what characters (or combinations of characters) are most predictive of female reproductive output. Our preliminary results on 48 females suggest that maximum depth is the main trait predictive of female reproductive fitness. Using this approach, we will define axes from PCA analyses that explain the most variance in the data, and incorporate this into multiple regression models. These data will allow us to determine what features of competitive females are potential predictors of male choice, female reproductive, and thus, sexual selection in a model organism with a sex role reversed mating system.

013. Terrestrial Ecology and Management II

Terrestrial Ecology and Management

Paper Session

3:30 to 5:00 pm

Ocean & Coastal Studies Building: Floor 1 - 142

Participants:

- 030 - Effects of acclimation temperature on the critical thermal limits of the tawny crazy ant (*Nylanderia fulva*)
Lance Cameron Umlang, Sam Houston State University

Temperature can be considered among the most pervasive abiotic factors contributing to the success of invasive species due to its direct effects on the biochemical processes of organisms. Data concerning the influence of changing temperature on such physiological parameters can be useful for predicting future range distributions of an invading species such as the tawny crazy ant (*Nylanderia fulva*), however such data are unavailable at present. Critical thermal (CT) maxima (CTMax) and critical thermal minima (CTMin) were determined for workers of the tawny crazy ant, *Nylanderia fulva*. Ants used for CT testing were taken from polygynous colonies collected from three locations in southeastern Texas. CT testing was performed following seven day acclimation periods at one of six randomly assigned experimental temperatures: 10, 15, 20, 25, 30 and 35 degrees Celcius. Analysis of the mean CT values recorded for ants from all three locations revealed significant changes in magnitude across the range of experimental acclimation temperatures used during both CTMax and CTMin tests. Average CT values ranged from approximately 49.2 – 50.7 C (CTMax) and 4.9 – 5.2 C (CTMin) across the three *N. fulva* populations. A significant interaction effect was also observed between the location tested and the acclimation temperature used for both CTMax and CTMin testing. The data collected during this study are among the first reported for the tawny crazy ant in the United States and represent valuable progress towards further understanding of the physiological tolerances of this invasive species.

- 031 - Status of the subtropical tamarisk beetle (*Diorhabda* spp.) as a saltcedar (*Tamarix*) biocontrol agent along the Río Grande in Presidio County and its impact on a non-target species, *Tamarix aphylla*
Anne Marie Hilscher, Sul Ross State University; Chris M Ritzi, Sul Ross State University
 Saltcedar (*Tamarix* spp.) is a deciduous shrub or small tree that was introduced into the United States from Eurasia in the early 1800s to stabilize riverbank erosion and to serve as a windbreak and ornamental. However, due to a high reproductive potential, saltcedar has become invasive on many river systems in the western United States. In an attempt to control this plant by biological means, several species of tamarisk leaf beetle (*Diorhabda* spp.) were released in the United States by the USDA. Two species of leaf beetles were established along the Río Grande River in Texas, with the subtropical tamarisk beetle (*D. sublineata*) dominating the biocontrol efforts. In addition, observations indicated that the tamarisk leaf beetles were capable

of feeding and egg-laying on a sister taxa, athel (*T. aphylla*). Although athels are exotic, they are more widely accepted in the region and are grown for shade and windbreaks. Currently seven sites along the Río Grande River, from Lajitas, TX to Candelaria, TX, are being monitored to determine the long-term impact on the saltcedar and on the non-target athels in the region. As of fall 2013, beetle numbers have remained steady and defoliation is consistent.

032 - Tardigrade Community Structure in Three Lichen Body Forms *Renee Marie Brammer, Temple College*

Tardigrades are microscopic animals that live in aquatic or moist environments, such as in the interstitial spaces of lichens and moss. While their cryptobiotic abilities are well studied, little is known about their habitat preferences, community structure, or distribution. This research addresses these ecological topics by analyzing a central Texas tardigrade assemblage in three lichen body forms: crustose, fruticose, and foliose. Crustose lichens are flat and adhere tightly to the substrate on which they grow, providing little interstitial space, fruticose lichens are the most 3 dimensional, growing away from the substrate and foliose is an intermediate form, with only the edge of the thallus elevated above the substrate. Temperature, humidity, and the condition of the lichen substrate were recorded in order to characterize the environment. The tardigrade community was composed of *Milnesium tardigradum*, *Macrobiotus areolatus*, and *Ramazzottius oberhaeuseri* which exhibited substantial abundances, particularly *R. oberhaeuseri*, but low overall species diversity. Environmental conditions did influence tardigrade community structure, with the condition of the lichen substrate having the most substantial influence. All three tardigrade species were found in all three lichen body forms, but greatly preferred foliose lichens.

033 - Preliminary survey of terrestrial snail species of Bell County, TX *Cecil Anne Lherisson, Univ of Mary Hardin-Baylor; Kathleen Wood, University of Mary Hardin-Baylor*

In an attempt to assess snail species diversity in Bell County, Texas, 19 sites were surveyed during the summer and fall season of 2013 to determine what species of terrestrial snails were present. Shells and live specimens were collected to serve as a reference collection and both were identified using a dichotomous key. The following 15 macro-snail species were found to be present: *Rumina decollata*, *Rabdotus dealbatus*, *Rabdotus mooreanus*, *Anguispira alternatas*, *Otala lactea*, *Helicina orbiculata*, *Succinea luteola*, *Triodopsis cragini*, *Mesodon roemeri*, *Mesodon thyroideus*, *Practicolella berlandieriana*, *Polygyra texasiana*, *Polygyra mooreana*, *Polygyra dorfeuilleana*, and *Polygyra septemvolvata*. Several micro-snails were found as well with identifications pending. The location types, survival strategies, and general characteristics for a selection of these snails were described.

034 - A comparison of the ectoparasitic fauna of *Peromyscus* and Heteromyidae taxa between Presidio County, TX and Cusuco and La Tigra National Parks in Honduras, Central America *Lizbeth Marquez, Sul Ross State University; Chris M Ritz, Sul Ross State University*

Mites have been greatly understudied within the Western Hemispheric tropics, especially within the country of Honduras in Central America. These ectoparasites are overlooked in favor of their insect cousins such as fleas and lice, primarily due to their smaller size and lack of trained taxonomic specialists. As a result, studies assessing an area's overall biodiversity typically exclude these acarid ectoparasites. Mite ectoparasites are believed to occur in higher abundance and occurrence in Neotropical areas. This research will determine taxonomic groups of ectoparasites of the Trans-Pecos, documenting host-parasitic relationships in Presidio County, TX and comparing them with the ectoparasitic communities found in an entirely different ecological zone, that of the country of Honduras. Data will be presented based on a comparison of similar genera and families of rodent hosts from both regions and genera and species

of parasites recovered from them.

014. Anthropology

Anthropology

Paper Session

3:30 to 5:00 pm

Powell Marine Engineering Complex: Floor 1 - 144

Participants:

035 - Social Transformations in the Mimbres Region of southern New Mexico from A.D. 1150 to 1450: An Investigation of the Black Mountain Site (LA 49) *Kathryn Putsavage, University of Colorado, Boulder*

In the Mimbres region of southern New Mexico, the Black Mountain site (LA 49) is well-known but poorly understood because of long-term and extensive vandalism. Since the site is probably the largest post-Classic Mimbres pueblo in the Lower Mimbres Valley, research at the site could significantly add to current understandings of demographic and social transformations in the southern Southwest after A.D. 1130/1150. From 2010 to 2012, the University of Colorado conducted three seasons of field research examining two periods of social transformation at the Black Mountain site. The first period of transformation occurred around A.D. 1150 and represents the transition between the Classic Mimbres (A.D. 1000 to 1150) and Black Mountain phase (A.D. 1150 to 1250/1300). The second period of transformation represents the transition from the Black Mountain to the Cliff phase (A.D. 1250 to 1450). Both of these phase transitions encompass a range of transformative processes including population replacement and reorganization, changes in economic networks, adaptations to changing or new environments, and/or reorganization of social networks. The scale, chronology, and nature of these two transformations are not fully understood. This paper describes recent research at the Black Mountain site which is providing new insight about these complex social processes.

036 - Recent Archaeological Investigations at San Pedro Springs Park *Stephen Smith, Center for Archaeological Research- UT San Antonio; Sarah Wigley, Center for Archaeological Research, Anthro. UTSA; Kristi Nichols, Center for Archaeological Research@ UT San Antonio; Raymond Mauldin, Center for Archaeological Research, UT San Antonio*

Located near downtown San Antonio in Bexar County, Texas, San Pedro Springs Park (41BX19) is a significant historic and prehistoric site listed on the Nation Register of Historic Places (NRHP). The Park surrounds a series of freshwater springs, the largest of which was at the head of San Pedro Creek. Not surprisingly given this apparently consistent water source, archaeological work has documented both historic and prehistoric occupations within the Park. Historic documents suggest that the Park was visited by Spanish explores in the late 1600s, at which time a large population of Native Americans were encounter. Recent test excavations in San Pedro Park have revealed a substantial archaeological deposit consisting of a high density of chipped stone tools, debitage, charcoal, burned rock, and bone. While the upper portion of the deposits appears to have been truncated by historic or more recent construction activities, our preliminary analysis suggests that this ca. 60+ cm thick deposit accumulated over several thousand years. Tools recovered from near the top of the extant deposit suggest occupation in the Late Archaic Period (ca. 4200 – 1200 BP), with tools at depth suggesting Early Archaic (9000-6800 BP) use. The density and diversity of tools suggests that the deposit may represent a formal refuse midden. These features are often present in situations where site maintenance activities are conducted in the context of long-term residential use.

037 - Seasonal Diet Reconstructed in High Resolution from Stable Carbon and Nitrogen Isotopes in Prehistoric Hair: A Case Study from the Lower Pecos Region of Texas. *Kirsten Verostick, Center for Archaeological Research, University of*

Texas San Antonio

Stable isotope research has experienced refinements in analytical techniques and interpretations allowing complex reconstructions of prehistoric diets at variable temporal scales. This paper presents a high resolution analysis of hunter-gatherer diet in the Lower Pecos region using stable carbon and nitrogen isotopic data extracted from human hair. Isotopic analysis of hair from a desiccated Late Archaic (ca. 1200 cal BP) individual recovered in the 1930s from a rock shelter illustrates a monthly diet reconstruction. The establishment of the early summer as an approximate season of death for this individual, called the Skiles Mummy, is critical to this reconstruction. This early summer period is inferred based on previous analysis of intestinal contents. Assuming a rate of hair growth at roughly 1 cm a month, the approximate period of death allows a monthly determination of stable carbon and nitrogen isotopic values in hair segments for roughly the last 1.5 years of life for this individual. These data show seasonal shifts over a single year, with a 2.9‰ difference in $\delta^{13}\text{C}$ values and a 1‰ difference in $\delta^{15}\text{N}$ values. When combined with ecological data on resource availability, the results of this fine-grained reconstruction allow us to address questions about seasonal resource use in the region.

038 - Stable Isotopes and Historic Period Diets at Mission San Juan, Bexar County, Texas. *Cynthia Munoz, Center for Archaeological Research, UTSA; Raymond Mauldin, Center for Archaeological Research, UT San Antonio*

Stable isotopic data from burials at Mission San Juan, Bexar County, Texas (Cargill 1996) suggests that Mission populations consumed a C4/CAM diet ($\delta^{13}\text{C}$ carbonate mean = -5.0‰; $\delta^{13}\text{C}$ collagen mean = -9.6‰) with enriched nitrogen ($\delta^{15}\text{N}$ mean = 11.9‰). While some of these isotopic results are consistent with historic accounts of Mission diet (e.g., a focus on C4 maize), the dependence on C4 based animals with high nitrogen values led to suggestions that the human isotopic values reflected a pre-mission signature, possibly from the Texas Coast (Cargill 1996). We present isotopic data from 39 animals recovered from recent excavations at San Juan. Carbon values suggest C3 subsistence for turtles, deer, turkey, and sheep/goat ($\delta^{13}\text{C}$ carbonate mean = -9.2‰; $\delta^{13}\text{C}$ collagen mean = -18.4‰), a strong C4 diet with some C3 for catfish, bison, and cow ($\delta^{13}\text{C}$ carbonate mean = -5.2‰; $\delta^{13}\text{C}$ collagen mean = -12.8‰), and a C4 diet for chickens and pigs ($\delta^{13}\text{C}$ carbonate mean = -4.3‰; $\delta^{13}\text{C}$ collagen mean = -10.0‰). To reconstruct possible human diet sources, we focus on the fauna in the two C4 groups. Assuming a nitrogen enrichment of 3.5‰, the consumption of cows ($\delta^{15}\text{N} = 7.4‰$) would produce $\delta^{15}\text{N}$ values of 10.9‰ in humans. The addition of other high C4 nitrogen sources (e.g., chicken, $\delta^{15}\text{N} = 9.4‰$; catfish, $\delta^{15}\text{N} = 9.0‰$) would elevate human nitrogen values, mimicking the coastal signature Cargill suggested. San Juan Mission population may have been recent coastal immigrants, but it is also likely that they consumed a local diet with high C4 and enriched nitrogen components.

015. Conservation Ecology I

Conservation Ecology

Paper Session

3:30 to 5:00 pm

Powell Marine Engineering Complex: Floor 1 - 145

Participants:

039 - Barnacles as potential indicators of estuarine system recovery *Crystal Martinez, University of Texas-Brownsville; Alejandro Fierro-Cabo, University of Texas-Brownsville*
Sessile invertebrates such as barnacles have been successful biomonitors in several ecotoxicological studies. Barnacles may be particularly suitable ecological indicators as growth rate and recruitment population dynamics reflect variable environmental conditions. To our knowledge no previous studies have used these organisms as indicators from an ecological restoration perspective. The purpose of this study is to determine the potential use of the ivory barnacle (*Balanus eburneus*) as a biological monitor of ecosystem recovery in south Texas

estuarine systems. This study, conducted over a year, investigates barnacle population dynamics in two sites within the Bahia Grande complex, in addition to San Martin Lake and South Bay, located at the southernmost extension of the Laguna Madre, Texas. The Bahia Grande complex was re-flooded in 2005 as part of one of the nation's largest wetland restoration projects, whereas San Martin Lake receives irrigation district water and South Bay is considered relatively undisturbed. Preliminary analysis of barnacle growth suggests barnacles from both Bahia Grande sites have similar growth rates to those of South Bay, the reference site. Mean relative growth rates for all sites also follow similar patterns with the most marked similarities between Bahia Grande South and South Bay. A similar pattern for recruitment among sites can be observed in both Bahia Grande South and South Bay. Barnacle derived metrics appear to indicate system recovery.

040 - Effects of environmental concentrations of malathion on behavior of an exotic invasive fish *Jake Caz Crawley, Schreiner University; Chris Distel, Schreiner University*

Armored catfish, *Hypostomus plecostomus*, and other exotic species have been introduced into aquatic systems in Texas and globally. The ecological interactions of these species are still not well known. Malathion is one of the most commonly found pesticides in surface water. It belongs to a class of insecticides that function by inhibiting cholinesterase activity. These pesticides often disrupt the behavior of non-target aquatic vertebrates like fish. We evaluated the behavioral and metabolic disturbances associated with exposure to malathion in these fish to better understand possible ecological impacts. Metabolic activity was evaluated through measurement of dissolved oxygen consumption and feeding. Our work is the first to evaluate metabolic impacts of malathion exposure on armored catfish. We present implications for ecological interactions and conservation.

041 - Exotic armored catfish reduce survival and growth of native amphibians *Courtney Neleigh, Schreiner University; Cynthia Owsley, Schreiner University; Chris Distel, Schreiner University*

Invasive species threaten biodiversity worldwide. Armored catfish, which are benthic grazers, have been introduced globally and damage ecosystems in numerous ways. However, their competitive interactions with native benthic grazers have not been tested. In this study, we tested for the effects of an invasive armored catfish (*Hypostomus plecostomus*) on performance in native Rio Grande leopard frog (*Rana berlandieri*) tadpoles. Aquarium tests showed that armored catfish negatively affect native amphibian survival and growth even when food is abundant. However, mesocosm tests showed no effects or competition. While the mechanisms of effect remain unclear this is the first study to demonstrate exotic armored catfish as a direct threat to native amphibians, which are declining globally.

042 - GloBI and GoMexSI: Providing access to a world (and Gulf) of species interactions *James Simons, Texas A&M University-Corpus Christi; Jorrit Poelen, Freelance Software Engineer; Christopher Mungall, Lawrence Berkeley Laboratory; May Yuan, University of Oklahoma; Cristina Carollo, Texas A&M University-Corpus Christi; Marie Eugenia Vega-Cendejas, CINVESTAV; Dave Reed, FWRI*

Much attention has been devoted to the measurement and cataloguing of biodiversity throughout the world and the Gulf of Mexico over the past 30 to 50 years. However, the systematic recording and cataloguing of species interactions has received far less attention. Nevertheless, it is this biostructure that defines and governs the flow of energy through the ecosystem. Global Biotic Interactions (GloBI) infrastructure provides an open platform to normalize, aggregate and access existing species interaction datasets. GloBI is collaborating with Gulf of Mexico Species Interactions (GoMexSI) to make existing marine species interaction datasets easily accessible for educators, scientists and enthusiasts. Using GloBI, GoMexSI has collected, extracted, and

archived about 70,000 trophic interactions involving about 1,500 marine and estuarine species. This dataset comprises an estimated 6% of the total known interaction datasets for the Gulf of Mexico. Not only is GoMexSI interaction data freely available on <http://gomexsi.tamucc.edu> (launched Sept 2013), it is also available on the Encyclopedia of Life (<http://eol.org>, as of Jan 2014) along with about 400,000 other recorded species interactions across 30,000 distinct taxa from 10 other GloBI data contributors. We believe that continued access to GoMexSI datasets will be invaluable to fisheries modelers using Ecopath, Atlantis, or OSMOSE models. Also, the continued aggregation of interaction datasets through GloBI will enable scientists and the public alike to answer questions that will help us to better understand our ecosystems so we can make better decisions to conserve our planet.

043 - Preserving Texas' Endemics: Insight into how understanding individual-level variation in behavior can aid conservation efforts of endangered spring fishes *Raelynn Deaton Haynes, St. Edward's University*

A long-term study investigating potential for reproductive isolation and hybridization between the endangered Pecos gambusia (*Gambusia nobilis*) and the introduced largespring gambusia (*Gambusia geiseri*) has provided insight into how understanding individual-level differences in behavior can aid in the conservation of *G. nobilis*. I will review some recent data on this system, and provide ideas for future studies that may elucidate some remaining questions regarding the potential for reproductive isolation and hybridization. Currently, *G. nobilis* persists in only five springs in Texas and New Mexico, is often outnumbered by *G. geiseri* in three of these habitats, and is thought to hybridize with *G. geiseri* in at least one. To date, our studies on mating behaviors show that when males are presented with a conspecific vs. a heterospecific, both species nearly always prefer their own, and rarely mate with the heterospecific. However, when males are presented with a choice between the conspecific vs. heterospecific, mating permissiveness increases markedly compared to "no choice" experiments, although males still significantly prefer the conspecific. Testing mating behaviors, competition, and potential for hybridization under different environmental contexts (e.g. varying flow regimes) and with varying densities of conspecific and heterospecifics is the focus of current work. Other factors also may be at play, including increased permissiveness due to differences in reproductive life history, if males are presented with larger heterospecific females (as males of both species typically prefer larger, more fecund females), or if activity levels and/or peak mating times are similar between species, and should be the focus for future studies.

016. Science Education II

Science Education

Paper Session

3:30 to 5:00 pm

Powell Marine Engineering Complex: Floor 1 - 146

Participants:

044 - Pink Eggs I am: The making of a clutch deposit informing the public about the invasive apple snail (*Pomacea maculata*) *Rebecca Elaine Petro, Southwestern University*

When communicating science to the public, the process must not intentionally "dumb down" the information. Instead, the idea should better convey the knowledge in a different, more easily comprehensible format to help avoid misunderstandings. This project proposes to use art, specifically sculpture and 3-D animation, to educate the public about an environmental issue. *Pomacea maculata*, a snail species that has invaded Texas and the US Gulf Coast (Karatayev et al 2009), has negative impacts on native plants and animal. The spread and continued establishment of new populations suggests that the public needs to be educated on the species and their impact. Based on dissections, photography and detailed scientific observations, I use a 3-D animation to demonstrate how their anatomical and reproductive

form fits function and how this may contribute to their success as an invasive species. I then compare *P. maculata* to similar, but not as successful, invasive species. At the end of my animation, I wish for the public to 1) understand how the anatomy of *P. maculata* makes it a successful invasive species; 2) be able to explain how the fertilization and packaging process of the eggs occurs; and 3) be able to understand why the snail species' reproductive organs have developed into their current form. By using 3-D animation to teach the subject matter, the viewer can experience the science; instead of making assumptions and misunderstanding diagrams. Art has the ability to engage people emotionally, causing them to become involved on a deeper level. Word Count: 250 words

045 - STEM principals: What they want and need *Sandra S, West, Texas State University*

The continued focus on STEM education requires that more attention be paid to the leadership role of principals who can either enhance or impede effective STEM education. Most principals do not have teaching experience in science or math and thus lack viewing the disciplines from a science or math perspective. Moreover, they are typically unknowledgeable of the research and best practice in the science and math disciplines. Decisions about budgets, hiring, curriculum, retention, facilities, equipment and scheduling are made from one's worldview. This session reveals what principals in our project report what they want and need to have an effective STEM education program at their schools

046 - Strategic "Dice"-isionmaking for Can't Stop *Stefan Terence Mecay, Schreiner University*

Can't Stop is a very addictive dice game that is easy to teach, yet difficult to master. The past two years I have taught two groups of students the rules, but purposely held back any strategic tips to see what strategies they would develop on their own. Through observation and analysis of countless games, I have been able to determine three highly successful strategies, "go big or go home", "high/low", and "middle ground" and will present the strengths and weaknesses of each strategy both from a probability and a game-theory aspect. This year, I also taught my students the "forced variant" to Can't Stop and will show the impact this variant has on these three strategies. I will also share some basic tips to help players of all experience levels.

047 - Structure and Function of Environmental Education and Literacy in Texas *Thomas L. Arsuffi, Texas Tech University Llano River Field Station; Jenny Strovos, Texas Tech University; Chris Moseley, University of Texas at San Antonio*

Water, the environment, and natural resources are critical issues for present and future generations. An ecologically literate public is needed to make informed decisions as resources become limited. Yet studies consistently reveal that the public suffers from a tremendous environmental literacy gap that is increasing rather than decreasing. Further, >90% of U.S. will live in urban areas and children will have increasingly little contact with nature. The disconnect between children and nature has important health, policy and career ramifications (Richard Louv, Last Child in the Woods). Here, we examine the structure and function of environmental education and literacy at various scales in Texas. First, we identify patterns in programs across Texas using a database and survey approach. Databases are used to advance many disciplines and this is the first to develop a comprehensive database of Texas environmental education programs and conduct an empirical analysis of their characteristics (location and major landscape features, instructional characteristics (Texas Essential Knowledge and Skills based, learning style, etc.), staff expertise, park capacity, habitats, ecosystems and biodiversity and curricular units and association with STEM subject areas. Next, the new Natural Resource and Environmental Literacy Plan for Texas provides a framework on getting the next generation informed on land, water, climate and ecosystems. The plan emerged from planning meetings, input from multiple stakeholders/ partnerships and

focuses on assessment and implementation approaches at all levels of environmental education, to improve ecological and scientific literacy of a public and generation increasingly removed from the natural resources on which they depend.

048 - Early research-track coursework enhances upper level learning outcomes *Chris Distel, Schreiner University*

Biology research and experiential learning have been made available to undergraduates at Schreiner University for credit from their first semester. Learning outcomes for students who have taken advantage of research opportunities were compared to those who did not in the same upper-level coursework. While the sample size is still small the results are encouraging.

049 - Teaching with TED *David Brooks, East Texas Baptist University*

Using video in the classroom is an effective way to increase student engagement. Problems come with finding videos that fit within time constraints and that contain information appropriate to the subject and educational level. This paper discusses using Technology, Entertainment and Design (TED) Talks as videos in the classroom. The videos cover a wide range of topics that include cutting edge information in brief segments. Several examples of TED videos will be shown that are utilized in anatomy and physiology classes.

017. Freshwater Sciences I

Freshwater Science

Paper Session

3:30 to 5:00 pm

Kirkham Hall: Floor 2 - 206

Participants:

050 - Why bigger may not always be better: a comparison of hatchling development of two apple snail species, *Pomacea maculata* and *Pomacea megastoma* *Amber Danae Cochran, Southwestern University*

Aquaculture and aquarium trades represent primary vectors for transportation of aquatic species globally and the most likely sources for future invasive species. Some apple snails belonging to the genus *Pomacea* exhibit high fecundity. One species, *P. maculata* (formerly *P. insularum*), has established exotic, invasive populations in Texas, across the US Gulf Coast and worldwide. Another non-invasive species, *P. megastoma* reaches larger sizes at adulthood than *P. maculata*, typically lives in lotic versus lentic systems and so far does not occur outside its native range. These two sister species share a number of common characteristics, including similar oviposition behavior (out of the water) and clutch appearance (spherical pinkish eggs). Recently, we conducted a comparative study of *P. maculata* and *P. megastoma* in their native habitat of Uruguay to investigate juvenile development of hatchlings. Our first experiment used a 2x2x2 factorial design (N=8) to test how species identity and size (*P. megastoma*, *P. maculata*), water quality (enriched with fish cue or not) and food resource (lettuce or aquatic macrophyte *Egeria densa*) influenced hatchling growth over 15 days. With individual measurements still on-going, preliminary observations suggest that *P. megastoma* hatchlings appear more sensitive to their environment (higher mortality) and require more conducive conditions for survival. We will investigate the sensitivity of *P. megastoma* further by comparing hatching efficiencies of 19 freshly laid *P. megastoma* egg clutches held dry (N=10) or placed under wet stress (N=9). Overall, understanding of juvenile development may provide insight into what makes a successful invasive apple snail.

051 - Effects of mercury deposition, coniferous forests, and fish size on mercury contamination of game fish in the south central U.S. *Ray Drenner, Texas Christian University; Matthew Murray Chumchal, Texas Christian University; Kimberly Adams, Texas Christian University*

Mercury (Hg) is a toxic metal that is found in aquatic food webs and is hazardous to human health. We examined the relationship

between Hg deposition, land coverage by coniferous forests, and average Hg concentrations in largemouth bass (*Micropterus salmoides*)-equivalent fish (LMBE) in 14 level III ecoregions within the south central United States. Eighty percent of the variance in average LMBE Hg concentrations between ecoregions could be accounted for by estimated Hg deposition after adjusting for the effects of coniferous forests. Fish size also played a role in the level of Hg contamination of fish, with the Hg concentrations in large, 64 cm total length (TL) trophy-sized LMBE being four times greater than the Hg concentrations in small, 20 cm TL stock-sized LMBE in ecoregions with high adjusted Hg deposition. All ecoregions had average concentrations of Hg in trophy-sized LMBE above 300 ng/g, the threshold concentration of Hg recommended by the U.S. Environmental Protection Agency for issuance of fish consumption advisories. In ecoregions with high adjusted Hg deposition, bans on consumption of trophy-sized LMBE may be warranted because average Hg concentrations in the LMBE were above 1000 ng/g. We show for the first time that large piscivorous game fish from ecoregions with high atmospheric Hg pollution and coniferous forest coverage can pose a significant hazard to human health.

052 - Do fish consumption advisories for mercury adequately protect the public? *Kimberly Adams, Texas Christian University; Ray Drenner, Texas Christian University; Matthew Murray Chumchal, Texas Christian University*

Mercury (Hg) is a widespread toxic compound that is harmful to public health when humans consume Hg-contaminated fish. States protect the public by issuing site-specific fish consumption advisories (FCA's). To evaluate whether current site-specific FCA's in six states in the south central U.S. confer adequate protection for the public, we obtained data on Hg concentrations in fish at 866 lentic and lotic sites from the National Descriptive Model of Mercury in Fish to estimate the proportion of water bodies that should have FCA's for Hg for an intermediate size of *Micropterus salmoides* (LMB) using the EPA's criteria of 300 ng/g. Sixty one percent of the water bodies are predicted to need a FCA, but only 26% currently have one. Another option to protect the public is for states to issue statewide FCA's warning against the consumption of individual or all fish species from every water body within the state. With the statewide advisory approach, we estimated that 39% of the water bodies would have an advisory when an advisory would not be warranted for LMB. Therefore two significant problems exist with the current fish consumption advisory systems for mercury. Site-specific FCA's "under-protect" the public against the consumption of Hg-contaminated fish thereby increasing human health risk. Statewide advisories "over-protect" the public and limit public consumption of fish from water bodies where the fish have low and safe Hg concentrations potentially causing economic harm.

053 - Use of methyl mercury as a tracer of aquatic carbon flux to terrestrial consumers *Shannon Speir, Texas Christian University; Matthew Murray Chumchal, Texas Christian University; Ray Drenner, Texas Christian University; Gary Cocke, Texas Christian University; Megan Lewis, Texas Christian University; Holly Whitt, Texas Christian University*

Only recently have we understood that carbon and toxicants are transported out of aquatic food chains to adjacent shoreline communities; however, our ability to trace carbon flux from aquatic to terrestrial ecosystems is limited. Because inorganic mercury (Hg) is only converted to toxic methyl mercury (MeHg) in aquatic ecosystems, MeHg can be used as tracer of aquatic-derived carbon. Aquatic organisms are exposed to MeHg through their diet, contaminating their tissues by binding strongly to amino acids. We used MeHg movement as a proxy for carbon movement from aquatic to terrestrial shoreline food chains by examining MeHg concentration and $\delta^{15}N$ (to indicate vertical trophic position) in an assembly of aquatic and terrestrial organisms from 10 shallow ponds (0.23 to 0.54 ha). We collected fish and tadpoles (fyke and dip nets), adult emergent

aquatic insects (emergence traps), and terrestrial insects (sweep nets). Samples were sorted into taxonomic groups, and muscle or whole body tissues were dried in a 60° drying oven, then homogenized. All samples were analyzed for MeHg concentration and $\delta^{15}\text{N}$. Using these two tracers, we identified distinct aquatic-based and terrestrial-based food chains. The long-jawed orb weaver, a terrestrial spider, was a part of the aquatic-based food chain. Our study suggests that MeHg could be used as a tracer of aquatic carbon flux to terrestrial consumers.

054 - Insect-Mediated Mercury Flux from Artificial Ponds of the Great Plains in a Changing Climate *Matthew Murray Chumchal, Texas Christian University; Ray Drenner, Texas Christian University*

We are in an era of unprecedented change due to human activities. This presentation examines the confluence of habitat change due to pond construction, mercury (Hg) pollution of the environment and how the role of ponds in the Hg cycle may be modified by future climate change in the Great Plains of the US. Humans have built millions of ponds in the Great Plains over the last 100 years and these ponds have become contaminated with atmospherically derived Hg. Methyl mercury (MeHg), one of the most toxic substances known to man, is produced in aquatic ecosystems, therefore the construction of the ponds is analogous to building millions of MeHg producing factories that contaminate aquatic consumers as well as emergent insects and the terrestrial consumers that feed on them. As with carbon, emergent aquatic insects also transfer Hg to terrestrial food webs adjacent to ponds. The role of these ponds in the Hg cycle may change with pond ontogeny, which alters permanence and predator-prey dynamics that regulate insect emergence patterns. It is likely the impact of these ponds on Hg contamination of the environment will be altered by climate change. These changes will vary geographically across the Great Plains with changes in temperature and precipitation. The number of ponds and permanence may decline in the south where temperatures are expected to increase and rainfall is predicted to decrease. In the northern Great Plains the number of ponds and permanence may increase because rainfall is expected to increase.

055 - Mercury-contaminated terrestrial spiders pose a potential health risk to songbirds at Caddo Lake, TX/LA *Gretchen Lee Gann, Texas Christian University; Cleveland H Powell, Texas Christian University; Matthew Murray Chumchal, Texas Christian University; Ray Drenner, Texas Christian University*

Mercury (Hg) is a global environmental contaminant that is harmful to wildlife health. Inorganic forms of Hg are deposited from the atmosphere and converted to methyl mercury (MeHg) in aquatic ecosystems. Because MeHg is only produced in aquatic ecosystems, a dogma has existed that Hg poses a risk to aquatic but not terrestrial wildlife. However, recent studies have shown that MeHg can be transported via emergent aquatic insects to terrestrial ecosystems where it may pose a risk to terrestrial wildlife that consume Hg-contaminated prey. Tetragnathid spiders are a key link between aquatic and terrestrial ecosystems because they consume emergent insects, become contaminated with Hg and then are consumed by songbirds. We collected tetragnathid spiders from 56 sites in three habitats (river, wetland and open water) at Caddo Lake, Texas/Louisiana and determined their Hg concentrations. We then determined potential MeHg risk to four species of songbirds (American Robin, Eastern Bluebird, Carolina Wren, Chickadee) known to consume spiders. Site-specific average MeHg concentrations in spiders ranged from 19.4 to 256 ng/g wet weight. Methyl mercury concentrations in spiders were significantly different between habitats and were highest and lowest in the river and open-water, respectively. Methyl mercury concentrations were high enough to pose a risk to all four species of songbirds and the potential risk varied with habitat and songbird species. This is the first study to find that Hg concentrations in terrestrial spiders can be high enough to pose a risk to songbirds in ecosystems contaminated by atmospheric deposition.

018. Marine Sciences I

Marine Science

Paper Session

3:30 to 5:00 pm

Kirkham Hall: Floor 2 - 207

Participants:

056 - Arctic Oil & Gas: Identifying Overlap and Discrepancies in U.S. and State of Alaska Offshore Management Strategies *Emilie Johannes, Texas A&M University at Galveston*

Changing climatic conditions and shifting global economics have thrust the Arctic into the spotlight of discussion for many scientists, academics, and policymakers, as well as those in the maritime industries such as offshore oil and gas exploration and production, shipping and offshore mining. The economic opportunities that the Arctic affords, and the high risks that are posed by pursuing those opportunities, call for a critical evaluation of associated risks and the development of effective management strategies to avoid environmental catastrophes and maintain safe conditions for the stakeholders involved. Predictions for the extent of sea ice loss vary greatly in scope and the effects of ocean acidification, among other potential effects of climate change in the Arctic, are largely unknown and currently being studied extensively. Despite these uncertainties, several facts have become apparent over the last several years: the volume of ship traffic through the region has increased and oil and gas deposits under the seabed remain important assets for the Arctic nations. These offshore activities can only be carried out if there is sufficient infrastructure to support them and thus, it is reasonable to assume that these Arctic coastal zones will be the sites of increasing development in the coming decades. This thesis will provide a detailed study of major federal and state documents that identify potential hazards in Alaska's Arctic coastal zones in order to determine overlapping concerns, discrepancies, and possible unidentified risks in the varying management strategies of these key planners. This comparison will also provide recommendations for ways to integrate the management strategies to allow for a more effective permitting process.

057 - Assessing deep-water coral assemblages inhabiting relict coral banks off the Texas Coast *Rebekah Rodriguez, University of Texas at Brownsville; David W. Hicks, University of Texas at Brownsville; John W. Tunnell, Texas A&M Corpus Christi; Thomas C. Shirley, Texas A&M University-Corpus Christi; Peter J. Etmoyer, National Oceanic and Atmospheric Administration (NOAA)-Coastal Center for Environmental Health and Biomolecular Research; Emma Hickerson, Flower Garden Banks National Marine Sanctuary (FGBNMS)-National Ocean Service (NOS)*

Community composition and distribution of deep water coral species were observed from five relict shelf-edge coralline banks off the south Texas coast including from north to south, Baker, Aransas, Dream, Blackfish Ridge, and a previously undescribed reef thereto referred as Harte Bank. Hermatypic corals flourished at these sites, collectively referred to as the South Texas Banks, approximately 21,000 to 12,000 years BP correlating with the late Pleistocene to early Holocene epochs. Today these reefs are located 97 km offshore and protrude to heights ranging 58 to 83 m below the sea surface with portions ranging between 14 to 20 m above the sea floor. Quantification of reef associated coral taxa was accomplished by reviewing video footage from an ROV deployed from the R/V Falkor of the Schmidt Ocean Institute in September 2012. Multiple ROV transects were made across each of the relict banks. Preliminary observations of the five banks suggest that the slopes are characterized by the octocorals *Stichopathes* sp., *Tanacetipathes* spp., and *Ellisella* sp. while the terraces are dominated by *Anitpathes* spp., *Hypnorgia* spp. and *Plexauridae*. We assume that the assemblages on these five banks are representative of the other 14 other banks in the same

geographical area which were mapped but could not be examined with the ROV because of time constraints.

- 058 - Characterization of two Physical Properties of Feed (Stability and Sinkability) Affecting Consumption Rates in *Litopenaeus vannamei*, Initial Mean Size, 9g/shrimp
Christopher Wade Jones, Texas A&M - Corpus Christi; Ivy C McClellan, Texas A&M - Corpus Christi; Addison L Lawrence, Texas Agrilife Shrimp Mariculture Research Facility; Jessica L Morgan, Texas A&M - College Station
Feed is the highest variable cost in shrimp mariculture. To obtain lower FCRs, optimum nutrient and physical quality along with proper feed management is important. Physical properties of feed directly affect nutrient quality and feed management efficiency. Sinkability was assessed by timing feed and determining percentage sunk at time. Stability was determined by placing feeds in a metabolic shaker and removed at six predetermined times ranging from zero to 150 minutes. Each feed tested was made using the same dietary formulation using different manufacturing and drying techniques. *Litopenaeus vannamei*. Hot extrusion processes appear to show greater stabilities in feed while cold pelleting produces lower stability. Cold pelleted, hot oven dried feed showed 24% reduction in stability compared to low temperature drying. Hot extruded, hot oven dried feed showed 2% reduction when compared to low temperature drying. Sinkability, excluding floating feed, ranged 96-100% after 40 seconds and showed little effect on consumption rate. Overall, floating feed exhibited reduced consumption. Stability ranged from 77-95% with higher stabilities producing lower consumption rates. SMP12-143 (hot extrusion, low temperature), showed the second lowest consumption rate (69%) while SMP12-147 (cold pelleting, hot oven), the highest consumption rate (88%). The above referenced diets demonstrated a direct relationship between consumption and growth with gains per week being 1.76 and 2.36 g/week, respectively. These results show that physical properties as affected by production do affect FCR and are essential in feed quality determination.
- 059 - Culvert reef structure densities may affect fish community diversity in Western Gulf of Mexico
Catheline Yasmin Magali Froehlich, University of Texas at Brownsville; Richard Joseph Kline, University of Texas at Brownsville
Artificial reef placements for the enhancement of sportfishes are becoming common in numerous countries around the world. Concrete structures, such as bridge spans and culverts, are commonly used as reef materials due to their availability and long service life. In the Western Gulf of Mexico, there is limited natural coral and hard structure covering the sand and mud bottom, and several new artificial reefs have recently been deployed. The current study uses underwater SCUBA surveys to investigate the benefit of artificial reef configuration at the South Padre Island Reef site. The reef is made up of thousands of culverts randomly deployed over a 1 km² area. Three distinct habitat types—dense patches of culverts, loose patches, and bare areas—are being compared in relation to the abundance and diversity of reef fishes and to red snapper size classes. To better characterize the patches being surveyed, side scan sonar data is collected from each patch location. From the sonar data, substrate rugosity, surface area cover, and substrate height are calculated, and each variable is compared against fish species diversity and red snapper size classes. To date, highest species richness and abundance are observed on dense patches, whereas species diversity and red snapper sizes are relatively equal among both dense and loose patches. Both culvert reef patch types provide a drastic increase in fish species abundance and diversity in relation to surrounding bare patches. Results will provide guidelines for future reef configurations that perform best in terms of reef fish populations.
- 060 - Evaluation of Differing Levels of Canola Protein Concentrate as a Potential Fish Meal Replacement in Pacific White Shrimp *Litopenaeus vannamei* Diets
Ivy C McClellan, Texas A&M - Corpus Christi; Addison L Lawrence, Texas

Agrilife Shrimp Mariculture Research Facility; Jessica L Morgan, Texas A&M - College Station

The objective of this research was to evaluate if canola protein concentrate (CPC) could replace fish meal (FM) in commercial shrimp feed (CSF) and determine what level of CPC could replace FM without affecting *L. vannamei* growth or survival. Fish meal is a major source of protein in CSF. Inclusion levels of FM in CSF typically range from 10% to 30%. Protein levels of approximately 30% in canola meal are not efficient in replacing FM in CSF. However, CPC has approximately a 65% protein level and therefore could potentially replace significant quantities of FM in CSF. Additionally, CPC has the potential to contain the desired levels of lysine and methionine relative to corn gluten and soy bean meal (SBM). The trials consisted of four diets containing different levels of CPC and SBM replacing FM on a protein basis from 10.1% to 30.3%. The determined growth rate in the linear growth phase for shrimp fed diet with 13% FM and 0% CPC was 2.35g/wk. The growth rate increased up to 2.55g/wk when an inclusion rate of 4.33% FM and partial replacement of SBM was replaced by 30.3% CPC. The results demonstrate that up to 30.3% CPC can be included in CSF through FM and SBM replacement. FM's current value between \$1,600 to \$1,800/mt represents a market with high potential monetary value as partial or complete substitution of FM. This will significantly decrease the cost of CSF.

- 061 - Quantifying recruitment of juvenile fish at an artificial reef in the Gulf of Mexico
Rachel Arney, University of Texas at Brownsville; Richard Joseph Kline, University of Texas at Brownsville

In 2011, the Texas Parks and Wildlife Department deployed 4,000 concrete culverts to an artificial reef eight miles off the coast of Port Mansfield, TX. These culverts contain highly desired sport fish species like the red snapper. Because the means of fish recruitment to artificial reefs is unclear and 1) may be attributed to settlement or movement of individuals to the reef sites and 2) may vary by habitat complexity, the aim of this study is to assess juvenile fish recruitment at particular culvert reef configurations and compare them with observed adult fish populations. Standard monitoring units for the recruitment of fishes (SMURFs) were used in this study, consisting of paired replica corals covered with 2 x 2-cm mesh. The structures were placed in habitat types of dense patches of culverts, loose patches of culverts, and bare areas surrounding the reef. Areas were further characterized by side-scan sonar imaging based on measurements of rugosity, vertical relief, and percent substrate cover. A comparison of each site was conducted in relation to recruit species' composition and body size. Fifteen different species belonging to nine families were sampled in the SMURFs. Juveniles of recreationally important species, like red snapper and several grouper species, were only found in loose or bare culvert areas indicating an effect of reef density. The use of SMURFs to characterize fish recruitment in this study will aid in our understanding of artificial reef function and help elucidate the artificial reef attraction vs. production theory.

019. Physics and Computer Science Session

Physics

Paper Session

3:30 to 5:15 pm

Classroom Lab Building: Floor 2 - 216

Participants:

- 062 - A Concept of Capturing a Fly by Earth Small Asteroids
Tyler Thomas, Midwestern State University; Salim Azzouz, Midwestern State University

Small-size asteroids are passing by earth at close range every day. Many of them carry valuable materials that are depleting or rare on earth. M-type asteroids carry platinum, palladium, rhodium, ruthenium, osmium, and iridium that are worth billions of dollars and needed for advanced technologies. In this project a series of ideas and concepts were thoroughly discussed with a

group of students and proposed to eventually create a strategic plan to capture a flying by earth asteroid. The proposed concepts are 1) using inexpensive modular rockets with reusable engines to shuttle from earth to an asteroid processing space station, 2) identifying flying by earth asteroids using powerful laser beams, 3) using advanced propulsion technology and multiple assistive earth gravity to approach high speed asteroids and force them into cislunar orbit, 4) processing the asteroid for earth re-entry or its materials at many cislunar space stations, 5) landing safely small asteroids on earth or their processed materials using cheap thermal protections, and finally 6) using the asteroid for science or processing of their rare earth elements for advanced technologies. The study group believes that developing this type of asteroid capture strategy will stimulate the advent of a new era of space exploration and colonization.

063 - Active Road Rumble Energy Harvesting System *Raymond*

Tyler Dalke, Midwestern State University; Salim Azzouz, Midwestern State University; Melody Coffey, Midwestern State University; Ryian Williams, Midwestern State University; Devyn Sutton, Midwestern State University

Vehicles traveling on busy highways waste a huge portion of their kinetic energy. Up to five percent of a car's energy is lost due to braking. In heavy traffic, there is a huge potential for man-made untapped energy to be harvested using a mechanical assembly built into the road. This project focuses on designing that device assembly that collects the energy of cars passing over depressible exciter keys that will act as pumps to a pneumatic system. The energy collected from the many exciter keys and multiple assemblies could be summed up in a series of pressure tanks, and then converted into electricity. The assemblies would be located where car drivers encounter deceleration ramps, when approaching a stop sign, or entering a toll plaza. The analysis of this active road rumbles concept involved 1) designing a prototype using the drawing software SolidWorks, 2) modeling the pneumatic system using Automation Studio Software, then 3) designing and building a physical prototype to analyze the pneumatic system's performances. A feasibility study is being conducted to evaluate the economic viability of such a system. The harvested energy is estimated using a model based on the dynamic impact theory. It is envisioned that such systems can be used in many ways; one of them is to empty a large deep offshore silo tank equipped with a pump turbine and filled with sea water. By allowing sea water back into the silo through a turbine, peak electricity can be generated.

064 - Light curves of exoplanets *Matthew Davis, Hardin-Simmons University; Cassidy Cantu, Hardin-Simmons University*

An exoplanet is a planet orbiting a star other than the Sun. The recent NASA Kepler space mission detected almost 250 confirmed exoplanets and 3,000 candidates still being evaluated. A common way exoplanets are detected is to observe the light curve for a specific star. Given the proper line up of the exoplanet's orbit and the star's equator with our line sight from Earth, the planet can pass in front of that star causing the amount of light received to decrease by about 3%. Using aperture photometry detecting this decrease as a function of time produces the light curve. Determining the time differential across the curve can yield important information about the exoplanet, including its orbit, mass, and diameter. In this project we analyzed the light curve from the exoplanet TrES-2 around the star GSC 03549-02811 in the constellation Draco at a distance of 718 ly from Earth. Data for the light curve was provided by the Trans-Atlantic Exoplanet Survey (TrES) using telescopes at the Lowell Observatory, Palomar Observatory, and La Palma (Canary Islands).

065 - Material Identification Through Spark Observation *Raymond Tyler Dalke, Midwestern State University; Jan Brink, Midwestern State University; Mark Weller, Midwestern State University*

Knowledge of material properties, production methods and manufacturing processes are each important subjects in the materials science discipline. Material testing methods are standardized by several organizations such as ASTM (American Society of Metals 1978). Materials are tested and their mechanical properties are tabulated in handbooks. This presentation will explain a study conducted at Midwestern State University located in Wichita Falls, Texas, on how a certain number of steels/cast iron might be identified through the observation of the sparks projected when a specimen is held against a grinding wheel. There are many factors that can change the spark patterns that are projected, but the main goal of this project is to attempt to standardize a method of spark testing and how it is performed. The study was conducted on fourteen different grades of steels/cast iron that are commonly used in manufacturing processes. A reference manual was created from the experimental data cataloging the spark pictures, hardness readings and pattern density cards for the fourteen tested steels/cast iron. This manual can be used by students and potentially by machine shops to identify samples of the included materials. This can lead to significant savings for machine shops by using a relatively easy, user friendly method, to identify unknown stock sitting around in the shop and the correct selection of materials for different applications.

066 - Solar Stirling Dish Engine Energy Harvesting Panel *Mallory Goon, Midwestern State University*

Stirling engines use a cycling fluid between a cold source and a heat source for their operation to produce mechanical power. Solar-Powered Stirling engines make use of the sun's rays as their heat source and the surrounding environment as their cold source. The sun's rays produce very high temperatures when concentrated on a small surface area through a solar dish. The highest temperatures are recorded at the focal point, where the hot side of the Stirling engine is exposed. An alpha solar-powered Stirling engine is being designed with a regenerator by a group of students for the purpose of building an additional experimental apparatus for the Heat Transfer Lab. The apparatus is also being built for research and testing purposes. A regenerator is included to maximize thermal efficiency by preventing heat loss to the environment, and air is chosen as the working fluid. The first and second laws of Thermodynamics are being applied to build a simulation model of the Stirling power cycle for dimensioning purposes. The fin theory is used to dimension and shape the cold side of the engine. The manufacturing of the apparatus and the preliminary experimental tests are expected to be finished by the end of March 2014.

067 - Automated Hydraulic and Pneumatic Drilling Application using a Palletizing Robot *Timothy Ray Green*

In the realm of engineering, every system or process will have flaws. Based on this assumption, every system or process is subject to constant evaluation and improvement. The group of a senior design class was given the opportunity to improve upon a robotic arm application with an automated wooden and plastic block palletizing system. This system incorporates both hydraulic and pneumatic components. Automation Studio was used to design and simulate the hydraulic peck drilling operation as well as the use of Solidworks to attain a finite element analysis on the system. The objective of this design was to eliminate the need for human interaction within the system after loading the hopper, implement a real hydraulic peck drilling operation rather than a drilling simulation, and allow the system to distinguish between wooden and plastic parts. The major enhancements for the previous design include: implementing a hydraulic drilling process, redesigning the current clamping drilling station, redesigning the manual feeder station, and designing a method to be able to distinguish in a robust and complete reliable method between a wooden part and a plastic part. Improvements of the design were made on the layout of the table itself where the robotic arm was located, the palletizing and de-palletizing operation, the hydraulic circuit, and the required programming code.

020. Environmental Science II

Environmental Science

Paper Session

3:30 to 5:00 pm

Powell Marine Engineering Complex: Floor 2 - 243

Participants:

- 068 - Potential effects of destratification on the phytoplankton of the Arroyo Colorado *Diana Huallpa, University of Texas Pan American; Edwin Quintero, University of Texas Pan American; Hudson DeYoe, University of Texas Pan American*

The Arroyo Colorado is one of the most highly eutrophic waterways in Texas. The Arroyo is consistently stratified with a bottom layer consisting of saline, anoxic, hydrogen-sulfide rich water and a top fresh or brackish layer having high algal biomass. These conditions have led to fish kills being not uncommon in the Arroyo. Environmental engineers have considered large-scale destratification of portions of the Arroyo to reduce fish kills. To predict the effect of mixing, we performed a series of lab experiments to determine the short-term effects on phytoplankton growth. Three factors- nutrients, salinity and hydrogen sulfide levels are likely important in determining phytoplankton growth. Top and bottom water from the Arroyo was collected once each season and combined in different proportions. Four treatments were applied- untreated top/untreated bottom, untreated top/aerated bottom, untreated top/filtered top, and untreated top/filtered top with adjusted salinity. Phytoplankton growth was monitored by in vivo fluorometry. As the proportion of bottom water increased, phytoplankton abundance decreased. It can be concluded that the hydrogen sulfide has a negative effect on the phytoplankton due to the drop of it in the mixtures of the aerated bottom water. Aerated bottom water alone did produce phytoplankton growth indicating that viable propagules were present. There was a clear seasonal difference amongst the trials with the March 2013 trial having a higher phytoplankton growth rate regardless of treatment. In conclusion, the effect of mixing of surface and bottom waters has variable effects on phytoplankton growth with many factors potentially involved.

- 069 - Remember the Ocelot: Effects of an international border fence on conservation efforts. *Kathryn Michelle Benavidez, St. Edward's University*

Unrivaled by few other regions in North America, the semi-tropical landscape of the Rio Grande Valley in Texas possesses an ecosystem rich in biodiversity. However, over the last century anthropogenic developments have disrupted the needs of native wildlife populations and today eight species in this region are currently endangered. Commonly known as the ocelot, *Leopardus paradalis* represents a species of great concern. With populations once extending as far as northern Texas, today a mere 50 individuals remain confined to the Lower Rio Grande Valley. The purpose of this research was to identify how border construction mandated by the Secure Fence Act of 2006 has affected ocelot conservation in Texas. Through field interviews, direct observation and analysis of U.S. Fish and Wildlife Service recovery plans, it has been shown that the border fence has severed potential corridors previously planned to connect ocelot populations in the U.S. with those in Mexico. For this reason, the focus of the U.S. Fish and Wildlife Service to increase genetic variability of ocelots in Texas has switched from creating wildlife corridors to supporting a translocation program, which is a plan to transfer a small number of ocelots from Mexico to Texas over a period of several years. A positive finding in this research indicated that the border fence does not extend to the Gulf Coast and therefore has yet to prohibit the creation of a corridor in this area. Overall, this research highlights the need to actively integrate ecological considerations into long-term policy and development decisions.

- 070 - Spatial and Temporal Modeling of Hg Fate and Dynamics in East Fork Poplar Creek Watershed *Maruthi Sridhar Balaji Bhaskar, Texas Southern University*
Monitoring of mercury (Hg) accumulation in fish has been conducted in East Fork Poplar Creek (EFPC) in Oak Ridge, Tennessee since 1985. The bioaccumulation of Hg in EFPC fish has proven to be enigmatic over the past several years, with remedial actions at the industrial facility in the creek's headwaters successfully decreasing total Hg concentrations in water, but not resulting in commensurate decreases in fish Hg concentrations. The primary goal of this project is to develop an understanding of the spatial dynamics of Hg loading and distribution in the EFPC watershed. A comprehensive geospatial database which incorporates all the spatial and analytical data of the EFPC watershed was developed. Our spatial analysis indicated that the Hg concentrations in the fish in the lower EFPC slowly increased with time compared to the upper EFPC.

021. Poster Session I

5:00 to 6:00 pm

P.E. Facility: Floor 1 – McCloy Arena

021-1. Poster Session I

Texas Academy of Science Annual Meeting
Special Event

021-2. Geosciences Poster Session

Geosciences

Poster Session

Participants:

- 071 - A Taxonomic and Taphonomic Description of a Large Ungulate Fossil from the Chadron Formation of the Buffalo Gap National Grasslands, South Dakota *John Hunter Green, Wayland Baptist University; Tim Walsh, Wayland Baptist University; David Schmidt, Westminster College*

In the summer of 2012, a large fossil mandible with left and right dentary was recovered through traditional field methods from Buffalo Gap National Grasslands, South Dakota. The fossil specimen was excavated from the Crazy Johnson member of the Chadron Formation. The Eocene age Chadron Formation consists of mostly fine clay material with scattered coarse-grained channel sandstones that were deposited in a fluvial environment. Due to poor preservation, laboratory preparation of the fossil consisted of cleaning, reconstructing and strengthening before observations and measurements could be made. This data was used in both qualitative and quantitative analyses to place the specimen in the correct taxonomic family as well as describing both developmental stage and taphonomy. Taphonomically, the specimen exhibited weathering pre and post fossilization, little transportation and no scavenging. After studies of tooth wear patterns and jaw size, it was determined that the animal had reached a sub-adult developmental stage. Large ungulate families from the White River Group (Chadronian NALMA) were considered for taxonomic placement. These include Camelidae, Brontotheriidae, Amynodontidae, Hyracodontidae and Rhinocerotidae. After comparing teeth and mandible morphometrics, all families were ruled out except Rhinocerotidae. The genera of Rhinocerotidae were further examined, which included *Penetrigonias*, *Trigonias*, *Amphicaenopus* and *Subhyracodon*. Analyses of tooth morphometrics conclude that the fossil mandible should be placed in the genus of *Trigonias*. Species level placement was not possible since there is no post-cranial data available.

- 072 - Mineralized Springs of Paleozoic Carbonates: Lampasas and San Saba Counties *Kevin W Stafford, Stephen F Austin State University; Alyx Frantzen, Stephen F Austin State University, Department of Chemistry; Melinda Shaw Faulkner, Stephen F Austin State University*
Mineralized springs occur in Lampasas and San Sab Counties, Texas in Paleozoic Carbonates, primarily Ordovician Ellenburger and Mississippian Marble Falls carbonates, and are associated

with hypogene karst development. Sulphur Spring occurs as an isolated mineral spring adjacent to the Colorado River; Gooch, Cooper, Hannah and Hancock springs occur as a cluster of mineral springs within the Lampasas city limits. These and other documented mineralized springs in the region were utilized as medicinal waters by pre-historic native inhabitants and in recent times by European settlers that migrated into the region. Today, they remain as significant cultural sites for local residents; however, little attention has focused on the origin and source of mineralization. Most springs in Lampasas and San Saba Counties exhibit typical physicochemical properties of karst terrains; mineralized springs are associated with mildly elevated temperatures, high total dissolved solids and hydrogen sulfide degassing. Mineralized springs exhibit elevated sulfate concentrations as well as elevated metals. These springs occur in regions of more intense fracturing as indicated by lineament analyses, which combined with geochemical characteristics suggests deep circulation flow paths where lateral migration and ascending fluids interact with mineralized zones proximal to basement rocks and overlying Cambrian strata within the region. Cross-formational fluid migration likely occurs as fast flow routes develop along near-vertical fractures, enabling mineralized water to be delivered from depths of more than 700 meters and discharge as mineralized, artesian springs with limited connectivity to the local surficial hydrogeologic system.

021-3. Marine Sciences Poster Session

Marine Science
Poster Session

Participants:

073 - A PILOT STUDY: MACROALGAL PREFERENCES

FOR *Diadema antillarum* ON THE MESOAMERICAN REEF IN ROATAN, HONDURAS
Clara Valentina Hernandez, McLennan Community College

Caribbean coral reefs have been observed to alternate states of coral dominance and macroalgal dominance (Mumby 2009); events known as phase-shift events. One factor that has been associated with macroalgal overgrowth has been the decline of *Diadema antillarum* populations after mass mortality events (Ogden 1987; Hughes 1994; Mumby 2009). *Diadema* were among the top algal grazers before their mass mortality and within a two year span after *Diadema* die-off, macroalgae such as *Dictyosphaeria cavernosa*, *Dictyota* sp., *Lobophora variegata*, *Aphiroa fragilissima*, *Jania adherens*, *Laurencia obtusa*, *Turbinaria turbinata*, and *Sargassum* sp., grew more rapidly than former dominant species (Ogden 1987). This study of *Diadema* dietary preference was conducted to help illuminate the role of *Diadema* in controlling algal overgrowth for potential phase-shift species. Urchins were placed in a flow through tank that was partitioned into three areas. Alga was placed on opposite sides of each urchin in a "Y" pattern and secured. The urchins were observed to determine which algal species was favored among them. *Diadema* preferred *Styopodium zonale* to *Padina* sp. and *Dictyota* sp. *Styopodium zonale* has not been observed as a problem alga in phase-shift events (Lirman and Biber 2000). Each of the specific phase-shift algal species needs to be tested for palatability to *Diadema*. In addition, future studies should focus on algal species documented in phase-shift events and collect *Diadema* at depths associated with algal dominated coral reefs to determine the role of *Diadema* in phase-shift events.

074 - Anthropogenic Influence on Coral Disease Density in Roatan, Honduras *Alexandria Rose Hensel, McLennan Community College*

Coral reefs across the world are facing degradation. Over the past three decades, coral reefs worldwide have experienced major changes in structure and function due to both anthropogenic and natural impacts (Coral Disease Handbook). According to Porter, these issues include direct and indirect anthropogenic disturbances (1992). Some bacteria linked with causation of coral disease are associated with humans (Coral Disease Handbook). Little research has been conducted regarding

anthropogenic impact on the frequency of coral disease. The objective of this study was to determine the human role in contributing to the frequency of coral disease in Roatan, Honduras. If humans increase the risk of coral disease, then dive sites with higher diving frequency may have a greater frequency of coral disease than sites with lower dive frequencies. Five dive sites, located on the west coast of Roatan, were studied twice during the research process. A 40m² transect line was used to determine the frequency of coral disease. Total Human Impact Values (THIV) were determined based on dive site frequencies and environmental factors determined by the Roatan Institute for Marine Sciences Education Coordinator, Jennifer Keck. These data suggested no correlation between the frequency of coral disease and Total Human Impact Values. These results could have been due to the late spring research dates, as some coral disease does not appear until much later in the summer. An in-depth study of the water current in the area should be conducted to further elucidate the environmental impact. Future studies should focus on comparing specific coral disease frequencies to each of the Human Impact Values.

075 - Assessment of south Texas black drum health using fatty acid, lipid, and stable isotopic approaches *Katherine Grace Sharp, Texas A&M University Corpus Christi*

Areas of the Laguna Madre, including Baffin Bay, have had near annual bloom occurrences of the brown tide alga *Aureoumbra lagunensis* since 1990. Beginning in 2011, local anglers reported black drum from Baffin Bay had lost muscle mass and in 2012, Texas Parks and Wildlife received reports that the tissue of emaciated black drum was gelatinous. Reasons for this decline in black drum health may be attributed to a possible decline in prey availability and the presence of a brown tide species, *A. lagunensis*. Total lipid content was significantly lower in black drum collected during early winter compared to fish collected from other Texas estuaries and from Baffin Bay. Essential fatty acid content was significantly lower in black drum collected in Baffin Bay compared to black drum collected from other areas in south Texas. The stress caused by the presence of these blooms may have altered the health of the entire food web in Baffin Bay compared to Nueces Bay, a healthier bay in south Texas. Samples will be collected to construct a food web for Nueces Bay to compare with Baffin Bay using fatty acid, lipid and stable isotopic analyses. Whole fish muscle tissue and fish muscle tissue delipidated by a chloroform methanol extraction method was compared to assure data was optimized for comparison.

076 - Baseline Hematology in *Tursiops truncatus* (Atlantic Bottlenose Dolphins), Roatan, Honduras *Connor Blaine Pogue, McLennan Community College*

Hematology studies are key tools in determining the health status of marine mammals in captive and wild populations. Large variations from average values in blood chemistry can mean illness or stress caused by disease, handling, or a combination of environmental factors. However, few comprehensive hematology studies have been done on marine mammals (Fair, 2006). This study examines baseline blood chemistry in open-water captive *Tursiops truncatus* (Atlantic Bottlenose Dolphins). A complete blood panel was taken for general health examinations from the dolphins located at the Anthony's Key Resort facility in Roatan, Honduras from 2003-2013 in order to monitor chemistry changes in the dolphin population located at the facility. The Anthony's Key enclosure is an open water pin that is part of the Atlantic Ocean. Standard ranges of blood chemistry were obtained by calculating averages from all standard values throughout the tested population. Mathematical calculations were used to find trends in the data based on the ages of the individuals to create baseline values for blood chemistry in the dolphin population. The data was separated by age of the dolphins at the time of the sample in order to minimize the effects that age has on the variability of blood chemistry. Values obtained include the mean and standard deviation of the following: white blood cells, neutrophils (banded and segmented), lymphocytes, eosinophils,

etc. The data obtained from this study, along with other studies, is crucial in determining general blood chemistry parameters for *Tursiops truncatus*.

077 - Characterization of Follicle Development in The Texas Diamondback Terrapin (*Malaclemys terrapin littoralis*) by Ultrasonography Rachel Rose George, University of Houston Clear Lake

The Diamondback terrapin is a unique turtle because it is the only turtle in North America adapted to brackish water. Little is known about terrapin reproduction in Texas due to difficulties in locating and monitoring their nesting beaches. Terrapin in other regions have shown a clear cycle of follicular development prior to egg development. The objectives of this experiment were to characterize patterns in follicle development in the Texas Diamondback Terrapin and the relationship between these patterns and potential effects on nesting timing. Also, we examined the relationship between follicle size and morphometric data to test the applicability of optimal egg size theory to this species. The optimal egg size theory states that regardless of body size a species will produce similar egg and clutch size. Two years of follicle data (2012 and 2013) were collected from female terrapin in and around Galveston Bay, Texas. A Sonosite ultrasound was used to examine the follicular stage and size of female terrapin found. Maximum follicle length was recorded with the ultrasounds internal calipers and verified later in the lab using ImageJ, to find possible differing results due to measuring technique. Other standard morphometric data were taken including carapace length, carapace width, and plastron length. Reproduction is essential to a species survival and understanding follicle development is the first step in understanding their entire reproductive process, potential fecundity, and thus appropriate conservation strategies.

078 - Comparative study of the effects of stormwater discharge on seagrass in the Lower Laguna Madre of Texas Sofia Schachner, The International Baccalaureate Program at Lamar Academy; Isaac Lopez, The International Baccalaureate Program at Lamar Academy; Eileen Martinez, The International Baccalaureate Program at Lamar Academy; Carolina Ramirez, The International Baccalaureate Program at Lamar Academy; Julia Goolsby, The International Baccalaureate Program at Lamar Academy; Anna McGilvray, The International Baccalaureate Program at Lamar Academy; Hudson DeYoe, University of Texas Pan American; Joseph Kowalski, The University of Texas - Pan American

Seagrass communities are keystone components in estuaries where they provide food and refuge for other estuarine organisms. In waters of less than 1 m depth nutrient loading can indirectly affect seagrass metabolism and growth by way of the cover and smothering of the seagrass canopy by drift macroalgae and epiphyte cover of the leaf surface. Consequently, wastewater and agricultural effluent (treated and untreated) point sources are of concern to natural resource managers. Two sites were studied, near a major stormwater discharge point that is currently being enlarged (Raymondville Drain) and a control site removed from wastewater and agricultural discharge. Seagrass biomass, density and cover, and morphology and sediment porewater nutrient concentrations, as well as drift macroalgal cover, were assessed at both sites in July 2013. Total seagrass biomass and tissue allocation were almost indistinguishable between sites. However, shoot density was more than three-fold greater at the Raymondville site (10,334 m⁻²) compared to the Cullen site (3860 m⁻²). Mean drift macroalgal percent cover was nearly 30 at the Raymondville site, but drift macroalgae were absent at the Cullen site. This corresponded with the Cullen site having a two-fold greater percent seagrass cover compared to the Raymondville site, but the difference was not statistically significant, likely because of high variability at each site. Sediment porewater concentrations were ca. 25% greater for NH₄⁺ and 38% greater for PO₄³⁻ at the Raymondville site, but

these differences were not significantly different. While these results are not definitive, there is sufficient evidence to suggest that the Raymondville site is under a degree of eutrophication to account for differences between sites.

079 - Nutrient dynamics of the black mangrove, *Avicennia germinans* (L.) L., in the Lower Laguna Madre of Texas Julia Goolsby, The International Baccalaureate Program at Lamar Academy; Eileen Martinez, The International Baccalaureate Program at Lamar Academy; Carolina Ramirez, The International Baccalaureate Program at Lamar Academy; Sofia Schachner, The International Baccalaureate Program at Lamar Academy; Anna McGilvray, The International Baccalaureate Program at Lamar Academy; Isaac Lopez, The International Baccalaureate Program at Lamar Academy; John Garcia, University of Texas Pan American; Hudson DeYoe, University of Texas Pan American; Warren Pulich, Jr., Texas State University - San Marcos; Joseph Kowalski, The University of Texas - Pan American

Mangroves are critical estuarine habitat and sources of outwelling of dissolved organic carbon, nitrogen and phosphorus. Black mangroves are found along shorelines of the Laguna Madre, including the Arroyo Colorado, a distributary of the Rio Grande which is now used as a municipal, agricultural, and stormwater drain. We hypothesized that mangroves under the influence of the eutrophic Arroyo Colorado would reflect the stable isotope signal of the Arroyo, compared to sites away from the Arroyo. The $\delta^{15}\text{N}$ of leaves collected at the Cullen Channel (distant from the Arroyo) site was lighter by more than one-half (+7.2), as compared to values in and around the Arroyo Colorado, ranging from +16.4 for tidal Arroyo plants to +13.1 (mean = +14.7) where the Arroyo drains into the Laguna Madre. A $\delta^{15}\text{N}$ value of +15.2 at asite north of the Arroyo Colorado is likely attributable to discharged water advected north by prevailing southeasterly winds. By comparison, $\delta^{15}\text{N}$ of leaves from South Bay, the least human-impacted site, and the tidal Rio Grande was +0.12 for both sites. There was almost no differences in $\delta^{13}\text{C}$ at any of the same sites, with values ranging from -23.8 to -25.6. C:N:P molar ratios of leaves from the presumed low nutrient site Cullen Channel were 469:23:1, while the Arroyo Colorado mangroves ratio was 319:21:1 along with the N isotope data suggests that there is not a big difference in nutrient availability but the source of that nitrogen is different.

080 - Nutrient limitation In the Lower Laguna Madre of Texas Eileen Martinez, The International Baccalaureate Program at Lamar Academy; Sofia Schachner, The International Baccalaureate Program at Lamar Academy; Carolina Ramirez, The International Baccalaureate Program at Lamar Academy; Anna McGilvray, The International Baccalaureate Program at Lamar Academy; Isaac Lopez, The International Baccalaureate Program at Lamar Academy; Julia Goolsby, The International Baccalaureate Program at Lamar Academy; Wendy Rogers, University of Texas Pan American; Hudson DeYoe, University of Texas Pan American; Joseph Kowalski, The University of Texas - Pan American

Classic paradigm predicts primary productivity to be limited by nitrogen (N) in marine waters with phosphorus (P) the limiting nutrient in freshwater systems. The Lower Laguna Madre (LLM) of Texas has few freshwater sources to contribute new nutrients. We evaluated nutrient limitation at two LLM locations: the tidally influenced Brazos-Santiago Pass and Green Island, near the mouth of the Arroyo Colorado (AC), the a major freshwater nutrient source for the LLM. We estimated community primary productivity of water amended with N, P, and N+P, compared to controls to assess N and P limitation at each site during a July 2013 cruise. Two-liter bottles with water from the two sites were treated with N, P, N+P or nothing (Control) and incubated in an

outdoor tank for 3 days. Primary productivity at the low-nutrient Brazos-Santiago Pass was more than two-fold greater than the AC site with N as the limiting macronutrient, while N and P co-limited community primary productivity at the Green Island site. Primary productivity at Brazos-Santiago was uncoupled from measurements of phytoplankton biomass with greatest chlorophyll (Chl) concentration found with the N+P treatment, significantly greater than the N treatment. Greater Chl concentration in the N + P treatment was congruent with primary productivity results at the Green Island site. These results support the paradigm that N plays a greater role in marine community metabolism, as compared to P when freshwater has some influence. However, our previous studies over the past half-dozen years have found that N and P have co-limited productivity in the Brazos-Santiago Pass.

081 - Photo Identification and Association Patterns of Bottlenose Dolphins (*Tursiops truncatus*) in the Galveston Ship Channel, Texas *Kelsey Elizabeth Johnson, TAMUG Marine Mammal Behavioral Ecology Group*

The purpose of the study is to analyze site fidelity, occurrence patterns, and association patterns of bottlenose dolphins (*T. truncatus*), in the Galveston Ship Channel between September 2013 and February 2014. The survey area was about 200,000 square meters of the ship channel. Photo-identification was used to identify individual dolphins. Associations were studied after photo identification was complete. The study shows which individual dolphins return to the ship channel and when, their behavior, and with which individuals they are associating. The photographs taken in this study have contributed to the Marine Mammal Behavioral Ecology Group database for long-term analysis.

082 - Potential for San Martin Lake, Texas to support phytoplankton growth *Paulina Flores, University of Texas Pan American; Wendy Rogers, University of Texas Pan American; Edwin Quintero, University of Texas Pan American; Hudson DeYoe, University of Texas Pan American*

San Martin Lake (SML) is a small estuary in south Texas that is fed at its north end by drainage water from the environs of Brownsville, Tx and drains at the south end into the Brownsville ship channel. Phytoplankton in SML can be abundant during certain times of the year. We were interested to determine if some of the variability of phytoplankton abundance in SML was due to variation in the availability of nutrients and also compare SML water's potential to support algal growth with water from nearby marine sites. Water was collected monthly from November 2012 to October 2013 from two sites in SML (CW- Central basin West, CE- Central basin East), the Brownsville ship channel (SC) and the Lower Laguna Madre (Bay). After collection, samples were filtered and frozen until the bioassay was run. Thawed mixed water was dispensed into 7 ml tubes for each site and date in quadruplicate and then inoculated with the marine microalga *Nannochloris* sp. The algae were allowed to grow under controlled stable conditions (25C and 300 uE/m2/sec) for about two weeks during which time growth of the algae was monitored by in vivo fluorometry. With a few exceptions, water from CW nearest the freshwater inflow produced the greatest growth response amongst the four sites. Greatest growth response at CW was noted in Jan and Feb 2013. Other sites lacked obvious seasonal trends.

083 - Primary productivity in the Lower Laguna Madre and Arroyo Colorado, Texas *Anna McGilvray, The International Baccalaureate Program at Lamar Academy; Julia Goolsby, The International Baccalaureate Program at Lamar Academy; Eileen Martinez, The International Baccalaureate Program at Lamar Academy; Sofia Schachner, The International Baccalaureate Program at Lamar Academy; Carolina Ramirez, The International Baccalaureate Program at Lamar Academy; Isaac Lopez, The International*

Baccalaureate Program at Lamar Academy; Wendy Rogers, University of Texas Pan American; Hudson DeYoe, University of Texas Pan American; Joseph Kowalski, The University of Texas - Pan American

Results are presented from an annual plankton primary productivity study of the influence of the Arroyo Colorado (AC) on the Lower Laguna Madre (LLM). The AC delivers nutrient-rich agricultural runoff and treated wastewater to the LLM, enriching the water column and stimulating phytoplankton primary productivity in the AC and potentially in the LLM. To assess the primary productivity in the areas variably influenced by the AC, we measured primary production using the light/dark bottle method to test the hypothesis that the influence of the AC would be greatest at sites nearest the AC confluence. Primary production rates were measured at four sites at varying distances from the AC. Production was greatest at an AC tidal site (368 µg O₂ µg Chl-1 hr-1), but that also had comparatively low chlorophyll (Chl) biomass (6.7 µg l-1). The next highest rates (21 µg O₂ µg Chl-1 hr-1) were significantly more than 17 times less, located north of the AC-LLM confluence at a site near the Port Mansfield Pass influenced by wind-driven currents. The Green Island site near the confluence of the AC strangely had the lowest primary productivity rates (1.1 µg O₂ hr-1 µg-1 Chl a), but greatest Chl biomass (66.7 µg l-1). As an area of mixing, the tidal portion of the AC is an ecotone where freshwater and estuarine phytoplankton communities mix. Explanation of this may lie in the possibility that remnants of brackish phytoplankton communities entering the marine environment of the LLM preserve biomass, but at compromised photosynthetic performance, or in the effects of freshwater on marine phytoplankton communities. Alternately, both N and P have been shown to limit production in this area.

084 - Scope for growth of *Scolecopsis squamata* before and after mercury exposure *Debra Hoekel, Texas A&M University-Corpus Christi*

Most studies of mercury in aquatic food webs have focused on commercially fished pelagic marine species and the entry of methylmercury into food webs and its subsequent trophic transfer is still poorly understood. Most studies have focused on deposit and suspension feeding invertebrates as the primary vector by which mercury enters estuarine food webs and the role they may play in the biomagnification of methylmercury at higher trophic levels. In comparison with freshwater environments, the lethal/sublethal effects of contaminants on marine or estuarine organisms, particularly invertebrates, have been poorly studied. Polychaete worms are a prevalent prey item in Texas recreational fish food webs and are consumed by forage fish such as pinfish (*Lagodon rhomboides*), thus have the potential to be both a source of bioaccumulation of methylmercury to higher trophic levels, as well as a limiting resource if their abundance in the food web is altered. Scope for growth (SFG) is a series of measurements of an energy budget, energy intake and metabolic output, which can be used to determine if the environmental stress of an animal is affecting an organism's growth and reproduction. By using SFG in a laboratory setting, sublethal effects of mercury contamination of *Scolecopsis squamata* will be determined. SFG of *S. squamata* will also be established before and after a mercury exposure period via a water column and a sediment surface inoculated algae source.

085 - Seasonal production and biomass of the subtropical seagrass, *Syringodium filiforme* Kützing (manatee grass) in the Lower Laguna Madre, Texas *Carolina Ramirez, The International Baccalaureate Program at Lamar Academy; Sofia Schachner, The International Baccalaureate Program at Lamar Academy; Julia Goolsby, The International Baccalaureate Program at Lamar Academy; Eileen Martinez, The International Baccalaureate Program at Lamar Academy; Anna McGilvray, The International Baccalaureate Program at Lamar Academy; Isaac Lopez, The International Baccalaureate Program at Lamar*

Academy; John Garcia, University of Texas Pan American; Hudson DeYoe, University of Texas Pan American; Joseph Kowalski, The University of Texas - Pan American

Syringodium filiforme (manatee grass) became the most abundant seagrass species in the Lower Laguna Madre over the past three decades, but its abundance has recently diminished. In the light of this ecosystem wide change, it is imperative to understand its production dynamics. Two sites were studied from January 1996 to August 1997, both at ca. 1.2 m depth. Site C, on the lee side of South Padre Island, was protected from prevailing southeasterly winds, compared to Site 103 situated in the middle of the Laguna, which was located adjacent to the Gulf Intracoastal Waterway and greater sediment resuspension. Total annual subsurface quanta at the study sites was ca. 6900 $\mu\text{E m}^{-2}$ at Site C and 6300 $\mu\text{E m}^{-2}$ at Site 103 (55 and 51% surface irradiance, respectively). Biomass, leaf production, and sexual reproduction were higher at Site C, but Site 103 had lower shoot density (1500 vs 8000 m^{-2} for Site C) and greater leaf lengths (60-80 cm vs 19-22 cm for Site C), suggesting light limitation at Site 103 and nutrient limitation at Site C. Molar carbon, nitrogen, and phosphorous ratios at each site supports this assertion with mean annual C:N ratios of 17 at Site 103 and 21 at Site C. Mean annual N:P ratios at Site 103 were 9, while mean annual N:P ratios at Site C were 22. Stable nitrogen ($\delta^{15}\text{N}$) isotopic values at Site 103 (mean = +5.4) suggest increased inorganic nitrogen availability, perhaps by way of sediment resuspension, while $\delta^{15}\text{N}$ values at Site C were comparatively deplete (mean = -0.36) in the ^{15}N isotope. The $\delta^{13}\text{C}$ values found at Site 103 (annual mean = -6.4) is also consistent with more negative $\delta^{13}\text{C}$ associated with lower light environments, as compared to the annual mean of -4.3 found at Site C, as suggested by the trends in *S. filiforme* biomass, leaf length, and shoot density.

- 086 - Spatial and temporal metagenomic classification of sediment prokaryotic communities inhabiting a hyper-saline estuary, the Laguna Madre (Texas, USA) *Meghan A Guzman, University of Texas - Pan American; Erin L Schuenzel, University of Texas - Pan American; Kristine Lowe, University of Texas - Pan American*

The Laguna Madre is a rare, subtropical, high-salt, estuary in South Texas. The Laguna Madre is only 1 of 5 hypersaline estuaries in the world and provides habitat to many rare, endangered, and migratory organisms. The macro-ecology of the ecosystem has been the focus of numerous past studies but little is known regarding the microbiology of the estuary. For this study, we determined the spatial and temporal composition of prokaryotic communities inhabiting the sediment of the Laguna Madre. Sediment samples were collected from 8 locations in the Laguna Madre in 2010, 2011, and 2012. Genomic DNA (gDNA) was extracted from the sediment using a phenol/chloroform protocol. The gDNA was amplified by PCR using 16S rRNA primers then sequenced using an Illumina MiSeq next-generation sequencer to identify the major taxonomic groups of prokaryotes in the sediment. Sequence data of the 8 locations were compared to elucidate spatial differences (site-to-site) and temporal changes (year-to-year) in the sediment community composition. Results showed the presence of several different phyla (e.g., Actinobacteria, Proteobacteria, Firmicutes, and others) comprising the sediment community and both spatial and temporal differences were observed. The study provides the first metagenomic analysis of sediment prokaryotes in this rare ecosystem and demonstrates that the sediment is inhabited by a diverse and dynamic microbial community.

021-4. Anthropology Poster Session

Anthropology
Poster Session

Participants:

- 087 - Developmental simulation of the adult cranial morphology of *Australopithecus sediba* using geometric morphometric techniques *Keely Carlson, Texas A&M*

University; Darryl de Ruiter, Texas A&M University; Kieran McNulty, University of Minnesota; Thomas DeWitt, Texas A&M University; Lee Berger, University of the Witwatersrand

Following the announcement of *Australopithecus sediba*, several critics expressed the concern that because the type specimen (MH1) was a juvenile, it might have undergone a significant amount of morphological change between its current stage of growth and development and full adulthood. They maintained that such transformations could potentially alter the original phylogenetic hypotheses concerning *Au. sediba*, including its status as a new species. Here we present a reconstruction and developmental simulation of the MH1 cranium using 3D geometric morphometric techniques. To estimate growth trajectories for comparative hominoid species, surface scans were obtained from male and female individuals with second molars erupted, and from male and female individuals with third molars erupted. Using an array of 3D landmarks and semilandmarks, growth vectors for each species were then applied to the original coordinates collected from MH1 to produce coordinates for the simulated adult cranium. The MH1 cranium was morphed into these coordinates using thin-plate spline analysis to produce a rendering of the adult specimen. Most morphological changes expected to occur between second and third molar eruption appear to be related to the development of secondary sexual characteristics. The most prominent changes are observed in the male gorilla growth vector, in which we see increased development of the glabella and supraorbital torus, combined with thickening of the zygomatic. However, changes observed for that of the human growth vector were minimal. Informed by taxon- and sex-specific models of craniofacial ontogeny, these results extend our knowledge of the evolutionary significance of *Au. sediba*.

- 088 - Patterns in Stable Carbon ($\delta^{13}\text{C}$ collagen, $\delta^{13}\text{C}$ carbonate) and Nitrogen ($\delta^{15}\text{N}$) Isotopes in Bone from Interments in Prehistoric Central Texas. *Raymond Mauldin, Center for Archaeological Research, UT San Antonio; Cynthia Munoz, Center for Archaeological Research, UTSA; Robert Hard, Department of Anthropology, UTSA*

During much of the roughly 12,000 years of human occupation in Central Texas, populations subsisted by hunting and gathering. For much of this sequence, archaeologists now have direct information on the types and relative amounts of plants and animals eaten through the analysis of stable isotopes of carbon and nitrogen from human bone. These data allow researchers to investigate long-term processes of stability and change in prehistoric diet. We present carbon and nitrogen stable isotope results from collagen and apatite for 75 mature individuals that date from 6,900 to about 300 BP. Recovered from multiple sites in the Central Texas area, these data show an initial use of plants and animals that use both CAM/C4 (e.g., prickly pear, agaves, bison) and C3 (e.g., deer, geophytes, nut resources) photosynthetic pathways. A gradual decline in the consumption of plant/animal resources that use the CAM/C4 pathways occurs over the next 3,000 years. Between 4000 and 3000 BP, there appears to be a brief interruption in this trend, with a mix of CAM/C4 resources again present. For the next 2100 years, CAM/C4 resource use again declines. By 950 BP, C3 resources dominate diets. This trend changes dramatically in the Terminal Late Prehistoric period (700-300 BP) with isotopes indicating a dramatic diversification of diet. This sudden diversity may indicate dietary change or it may reflect changes in mobility and alliance structures at this time, with increased movement of individuals in and out of the Central Texas area.

- 089 - Toward a Morphometric Phylogeny of Caddo Ceramics: A Test of 3D Geometric Morphometrics *Robert Z. Selden Jr., SFASU; Timothy K. Pertulla, SFASU; Michael J. O'Brien, University of Missouri*

In this poster we use 3D geometric morphometrics as an exploratory tool for examining diversity in vessel form (or shape)

among 27 whole or reconstructed Caddo vessels from the Vanderpool site in Smith County, Texas. Forty-one landmarks from each vessel were exported to version 2.5 of Morphologika for generalized Procrustes analysis and principal components analysis and were then exported to R for cluster analysis (depending on sample size). Despite the small sample size, results indicate that 3D geometric morphometric analysis is an avenue of ceramic research where substantive analytical gains can be realized.

090 - At the Confluence of GIS and Geochemistry: Identifying Geochemical Correlates of Ripley Engraved Caddo Ceramics *Robert Z. Selden Jr., SFASU; Timothy K. Perttula, SFASU*

In this poster, we discuss a new approach to the identification and definition of spatial trends in archeologically-recovered ceramics associated with geochemical results produced using instrumental neutron activation analysis (INAA). Using all of the Ripley Engraved INAA samples, we posit that clays in the Claiborne and Wilcox Groups can be successfully demarcated by sodium (Na), cerium (Ce), and zinc (Zn). Using a subset of those data from the Big Cypress Creek basin, we find that ceramics manufactured in three different Caddo political communities can be successfully demarcated based upon differential concentrations of arsenic (As), iron (Fe), and vanadium (V) found in the ceramic paste of Ripley Engraved sherds. With the larger dataset, we then identify six spatial trends associated with the geochemistry of Ripley Engraved Caddo ceramics.

091 - Instrumental Neutron Activation Analysis (INAA) of Shell-Tempered Ceramics in the Ancestral Caddo Region: Rethinking Methods *Robert Z. Selden Jr., SFASU; Timothy K. Perttula, SFASU*

The geochemical analysis of shell-tempered ceramics in the ancestral Caddo region has been a matter of confusion since the mid-1990s. While Caddo archaeologists have long perceived most or all of the shell-tempered ceramics in East Texas to have originated from two different areas within the Red River basin, the geochemical data and interpretations remain inconsistent with that idea. This poster takes another look at this dataset, and considers an approach that was initially put forth by MURR, and then seemingly abandoned. Using only the geochemical data from shell-tempered sherds, we take a closer look at the contributions of calcium (Ca), strontium (Sr), sodium (Na), and manganese (Mn), and illustrate the spatial and temporal consistencies that can be used to establish and expand arguments for the trade and/or exchange of shell-tempered ceramics from multiple locations in the Red River basin.

092 - Linking Instrumental Neutron Activation Analysis (INAA) with Geology in the Ancestral Caddo Region *Robert Z. Selden Jr., SFASU; Timothy K. Perttula, SFASU*

This poster illustrates the success of a novel method of INAA that was employed to reveal geochemical signatures in Caddo ceramic vessel sherds that correlate with local surficial geology. The geochemical data from the sherd assemblage were used within an exploration of potential ceramic provenance, which was successful at demarcating sherds from ceramic vessels made from clays in either the Claiborne or Wilcox Groups. Further geochemical segregation was also apparent between the Recklaw Formation in the Claiborne Group, and the Weches Formation in the Wilcox Group. These results point to a high degree of geochemical variability within the East Texas region, which stands in stark contrast with the numerous previous studies that seemed to indicate that the clays in the East Texas region were overwhelmingly homogenous. The analytical gains achieved through using this method seem to highlight an area of Caddo research where significant progress can be made with regard to the interpretation of analytical results in the future.

021-5. Botany Poster Session

Botany

Poster Session

Participants:

093 - Analysis of prospective PCR-based genetic markers for studying pod morphology variation in *Scorpiurus muricatus* L. *Roya P Hossaini, St. Edwards University; Michael A Grusak, USDA-ARS Children's Nutrition Research Center*
Scorpiurus muricatus is a forage crop in the legume family that yields pods that are coiled or uncoiled and can have short or long spines. The purpose of this research was to attempt to identify the genetic variation underlying these phenotypic differences by genotyping and phenotyping a segregating F2 population derived from two diverse parental genotypes. An F2 cross from parental lines PI247208A and PI287932 was analyzed for genetic variation using amplification with PCR-based molecular markers that had been used closely related legume species. In this study, 96 SSR markers from *Lotus japonicus*, 20 SSR markers from *Medicago truncatula* and 41 ISSR markers were screened against the parental genomes and F2 population. Successful primers yielded dominant and co-dominant products on electrophoresis gels. F2 lines were also scored for phenotypic variation in pod morphology and spine length. Phenotypic data were classified into three pod morphologies and spine lengths. Three SSR markers from *Medicago*, seven SSR markers from *Lotus* and one ISSR marker were chosen as potential markers for genetic characterization of 140 lines from the F2 population. Genetic categorization of the F2 population was integrated with phenotypic data to show any potential relationship between the markers and pod morphology; however, at this point, no significant associations have been identified. The information and tools in this analysis can be utilized for development of genetic markers and linkage mapping for the *Scorpiurus* genome. This work was supported in part by the Feed the Future Program funded by USAID.

094 - Growth and mineral dynamics in common bean (*Phaseolus vulgaris* L.) pods *Caitlin Coghlan, St. Edward's University; Michael A Grusak, USDA-ARS Children's Nutrition Research Center*

Legume seeds, including the common dried bean, are important in the agricultural food system for humans. Previous research in legumes has assessed pod wall weight and seed yield; however, little research has been done on the complete growth and mineral dynamics of the pod unit including the pod wall and seeds. Dry matter and mineral accumulation were studied in the pod and the seed, because there may be nutrient remobilization from the pod wall into the developing seeds. By understanding the growth dynamics of the pod unit, manipulations may be possible to increase seed mineral content. In this study, we grew plants of common bean (cultivar Micran) in the greenhouse until full maturity and collected pod and seed samples from 5 to 40 days after anthesis. Measurements of seed number and weight as well as pod weight were collected. Samples were then analyzed for mineral concentrations. It was found that the dry weight of the pod wall demonstrated a slight decline from day 15 to day 40, suggesting that there may have been remobilization of dry matter from the pod wall into the seeds. The mineral analysis reflected the same trend for certain pod mineral contents. The average seed dry weight as well as mineral content increased from day 15 to day 40. The results from this study of pod mineral dynamics can be used to develop strategies to increase seed mineral content. This work was supported in part by the Feed the Future Program funded by USAID.

095 - Potential calcium bioavailability of leafy vegetables: *Amaranthus* spp., *Gynandropsis gynandra*, and *Solanum* spp. *Daisy Yan Ju Chung, Rice University, Houston, TX; Michael A Grusak, USDA-ARS Children's Nutrition Research Center*
Calcium is an essential nutrient for humans that must be obtained through diet. One rich source of calcium is available in leafy

vegetables. However, certain leafy vegetables contain the antinutrient form of calcium, calcium oxalate crystals, which reduces the bioavailability of calcium for nutritional absorption. In this project, we investigated calcium oxalate crystals and mineral composition in several leafy vegetable species in search of potential crop plants with low crystal content and thus high potential calcium bioavailability. We focused the investigation on different accessions of *Amaranthus* spp., *Gynandropsis gynandra*, and *Solanum* spp., of which the presence of oxalate crystals have not yet been thoroughly studied. In addition, these are indigenous leafy vegetables grown in East Africa, and can be valuable alternative sources of calcium and other nutrients. To investigate calcium oxalate crystals in these leafy vegetables, we examined leaf disc samples with a compound microscope using polarizing optics. Mineral analysis was also conducted using inductively coupled plasma-optical emission spectroscopy. Our results indicate that all *Amaranthus* spp. studied have calcium oxalate crystals, and thus may have low calcium bioavailability; however, they do contain high concentrations of other essential minerals. *Gynandropsis gynandra* and *Solanum* spp. did not exhibit calcium oxalate crystals in their leaves and thus show promise to be promoted as calcium-rich plants. Selected accessions with high calcium bioavailability and rich mineral value should be considered as alternative dietary sources for nutrient-limited populations. This work was supported in part by funds from USDA-ARS under Agreement Number 58-6250-0-008 to MAG.

096 - The combined effects of varying nitrogen and water levels on the development and biomass of hard red winter wheat
Kevin Obkirchner, St. Edward's University; David R Johnson, St. Edward's University

The production and sale of winter wheat (*Triticum aestivum*), an important US grain, generates billions of dollars. Recent droughts, and predicted increases in the variability of water availability, highlight the importance of understanding how interactions between water stress and nitrogen (N) affect the biology of this plant. To explore this relationship, I studied individual wheat plants in a greenhouse environment along water and N gradients in a factorial design. I hypothesized that high water and N would lead to the highest biomass. Sprouted plants were randomly assigned to treatments of varied N (46% dry urea) and various numbers of days between watering (0-4). Following senescence, plants were dried, sorted into leaves, tillers, roots, and heads, and weighed. ANOVAs were performed to determine how the relationships between the treatment variables predicted above-ground biomass, below-ground biomass, and yield. Water variability significantly predicted both above- and below-ground biomass; the more water, the greater the biomass. While there was no relationship between N and above-ground biomass, high N resulted in greater below-ground biomass. These data confirm that more water does lead to greater biomass; but more interestingly, higher root biomass with added N may indicate that plants under water stress invest more biomass below-ground for water acquisition when N is available. This study suggests that under altered climate scenarios, water and N may interact in unpredictable ways that are not easily determined by considering each factor alone.

097 - The story of Texas wild rice, *Zizania texana*
Francis Ray Horne, Texas State University

Texas wild rice, *Zizania texana*, is a relict of the Last Ice Age. As an annual wild rice, known only from the San Marcos River, grows vertically and decumbent as two phenotypic morphs, is perennial in constant river temperature (22°C) & flowers as a day-neutral with highly viable seeds. Flowering is rare in the deep water where submerged growth is vegetative with large rooted clumps forming. Like other species of wild rice, Texas wild rice is a hardy plant, growing at ambient temperatures and has no known special or unique environmental requirements. Highly viable seeds germinate readily without a cold-dormant period, but seeds are intolerant to desiccation and thus not easily dispersed. Dense hairy seeds with a long awn sink to the bottom

with backward protruding hairs catching in substratum. In 1967 Emery reported one plant in Spring Lake, & none in the upper 0.5 mile of the river. Several years' later students in his taxonomy class collected yet an unreported second morph of *Z. texana* growing decumbent in the deeper swift water of the river. Ten years later, Emery reported this morph that had never been reported in the literature and had been over-looked for decades. San Marcos upper spring-area transformed from a shallow marsh to a deep lake via dam construction in the 1850's, and dredging in 1940's. Anthropomorphic activities to accommodate an amusement park have eliminated much of the original wild rice habitat.

021-6. Environmental Science Poster Session

Environmental Science

Poster Session

Participants:

098 - Atmospheric Carcinogenic Polycyclic Aromatic Hydrocarbons in Houston, TX, USA: Pine Needles as Passive Samplers
Sharmila Bhandari, Texas Southern University

Vehicle emissions contain carcinogenic contaminants, especially PAHs (polycyclic aromatic hydrocarbons). PAHs with molecular weight of 278 and 302 have been gaining more attention due to their higher cancer potency. This study measured HMW (high molecular weight) PAHs (5 rings or more) in pine needles that have not been analyzed commonly to assess atmospheric distribution of PAHs and their sources. Some of these target PAHs are known 10 times more carcinogenic than benzo[a]pyrene, which has been used as a reference PAH. Pine needle samples collected from the Houston area (total 30 sites) were analyzed for HMW PAHs using a GC-MS. Total concentrations of HMW PAHs (more than 25 PAHs) in pine needles samples varied from 31 to 762 ng/g (wet wt.). Benzo[b + j + k]fluoranthenes were most abundant and followed by indeno[1,2,3-cd]pyrene and benzo[ghi]perylene. Although concentrations of dibenzo[ah]anthracene and dibenzo[al]pyrene were lower than other HMW PAHs, they accounted for more than 50% of the total cancer potency because their cancer potency equivalency factors are 5 and 10 times of benzo[a]pyrene. PAH patterns and ratios of selected PAHs indicated that vehicle emission is the primary source. PAH concentrations had a positive correlation with distance from highways and/or busy traffic ways, providing additional evidence that vehicle emission is the primary source of PAHs in the Houston area. This study suggests that people who live in the inner city area are exposed to higher levels of PAHs.

099 - Differential impacts of organic and synthetic pesticides on the non-target organism *C. elegans* and on the target organism *Termitoidae*
Leah Mulaly, St. Edward's University

Pesticides can be organic or synthesized to mimic organic pesticides but be more stable in the environment (Davies 2007). Pesticides are absorbed into soil and affect non-target organisms such as *Caenorhabditis elegans*. In this study, we compared the effects of the organic pesticide, pyrethrum, to its synthetic counterpart, cypermethrin, and examined the effects of combining each with an organic synergist, parsley seed oil (PSO), in 1:1, 1:2, and 1:3 ratios. PSO alone was also tested. Each treatment was tested on the non-target organism, *C. elegans*, and the target organism *Termitoidae* (termites). 11 treatments of OP50 *E. coli* were prepared using the highest sub-lethal concentration of pesticide (5 µg/mL). After *C. elegans* cultures were exposed, motility was assessed via thrashing assay in liquid. There were no significant effects on motility of *C. elegans*. Additionally, lifespan was determined by age-synchronizing worms, exposing them to pesticide, then transferring them to egg-laying inhibitor plates. There were no significant effects on lifespan of *C. elegans*, but there was an inverse relationship between the concentration of PSO that *C. elegans* were exposed to and their size, compared to control worms. Termites were exposed to identical OP50 treatments and

lifespan was assessed. All termites exposed to PSO, cypermethrin, or both had significantly shorter lifespans than control termites. This suggests that PSO can be used to make cypermethrin effective in smaller doses, or used alone to exterminate pests, without having detrimental effects on *C. elegans*. Because PSO is biodegradable, these results can be considered in environmentally conscious agricultural practice.

100 - Effects of wet and dry weather events on bacteria (Enterococci) levels and detection of hotspots in a brackish water marina *Ryan Bare, East Texas Baptist University*
Approximately 50% of Texas surface waters are impaired with bacteria from fecal waste, including several tributaries and segments within the Galveston Bay system. This study took place in Marina Del Sol on Clear Lake in Kemah, Texas, USA and proposed that stormwater runoff was the primary cause of elevated Enterococci levels in the marina, that hotspots of Enterococci were present, and that the concentration of Enterococci increased from the entrance to the back portion of the marina. Sampling was conducted at 10 sites between 0800 and 1100 every Monday, Thursday, and Saturday over five weeks in June and July 2013. Enterococci concentrations were quantified using the IDEXX Enterolert method and three day rainfall accumulation prior to sampling was recorded from NOAA's Climate Data Online. Eleven dry weather and four wet weather events occurred during the sampling period with the largest rainfall accumulation peaking at 1.39 inches. The geometric means of wet versus dry weather samples were not significantly different. Two hotspots were found yielding geometric means of 42.98 and 41.25 CFU/100 mL, which exceed the U.S. EPA primary contact recreation limit of 35 CFU/100 mL. Additionally, EPA single sample maximums (104 CFU/100 mL) were exceeded at nine out of ten sampling sites at least once, including a spike of 1,445 CFU/100 mL and several others over 1,000 CFU/100 mL. A low to high gradient of Enterococci from the entrance to the back portion of the marina was evident. Further research is still needed to determine the primary sources of Enterococci.

101 - Proposal for Small-Scale Aquifer Storage and Recovery Systems in Rural Texas *Kayla Leeann Rohrbach, Schreiner University; David Mauk, Bandera County River Authority and Groundwater District; David Jeffery, Bandera County River Authority and Groundwater District; Chris Distel, Schreiner University*

For several years, Texas has suffered from a chronic drought that has severely stressed existing water sources. Aquifer Storage and Recovery (ASR) systems are a relatively new management tool that utilizes the aquifer to store surface water in times of abundance in order to be utilized during times of drought. Existing ASR systems are primarily large scale projects serving municipalities. ASR could be modified to fit the needs of rural communities by using rainwater catchment systems as the source of freshwater, thus alleviating some demand on the aquifers. However, there currently are regulatory hurdles which make small-scale ASR economically unfavorable. This study will consist of preliminary tests to assess the feasibility of a small-scale ASR model using the Cow Creek formation in the Middle Trinity Aquifer. The theoretical mechanics and benefits of this system will be measured, and certain tests will be conducted to measure the compatibility of the formation to receive the rainwater. Samples of collected rainwater will also be analyzed for biological contents to assess what forms of treatment will be required for this system to meet good water quality standards and to prevent the introduction of potentially harmful contaminants to the formation. The information will be gathered with the intent to possibly pilot this use of ASR systems and affect a regulatory change to allow this type of injection wells to come to use. Suggestions for improvement will be highly encouraged as this project is in its earliest stages.

102 - Spatial distribution of *Acer grandidentatum* within the Owl Mountain Province of the Fort Hood Military Installation, Texas *Melinda Shaw Faulkner, Stephen F Austin State University; Matthew W McBroom, Stephen F Austin State University; Kevin W Stafford, Stephen F Austin State University*

Bigtooth maple, *Acer grandidentatum*, a small deciduous hardwood tree indigenous to North America, exists as a continuous population in intermountain regions of the western United States. Smaller disjunct populations of bigtooth maple can be found throughout the southwest including several counties within the Edwards Plateau of central Texas. These stands are isolated from the larger populations by several hundred miles, and presumed to be relicts from the Pleistocene. Several of these isolated populations can be found within the Owl Mountain Province of the Fort Hood Military Installation, located within the Lampasas Cut Plain region in Bell and Coryell counties. The Owl Mountain Province is the northeastern section of Fort Hood and is used by the Army for dismounted and wheeled exercises, and some small-scale tracked vehicle training. In 1996, a large wildfire on the installation required additional monitoring and management actions for all threatened and endangered species. The Nature Conservancy and Fort Hood Natural Resources Management Branch conducted transect vegetation surveys in 1996 and 2011, identifying nine distinct areas of bigtooth maple habitat within the study area covering 710,331 m². Fifty-four 78.5 m² modified Whittaker vegetation plots were established within known maple habitat and an inventory of woody vegetation, soil characteristics, and percent cover recorded. Current data, when compared to previous vegetation surveys, show an encroachment of *Juniperus ashei* into areas where canopies have been opened or modified by disturbance.

103 - Surface Water Quality Assessment of a Stormwater Canal System, Edinburg, Texas *Marisol Bazaldua, Department of Biology, The University of Texas-Pan American; Courtney Huston, Department of Biology, The University of Texas-Pan American; Megan Villarreal, Department of Biology, The University of Texas-Pan American; Frank Joseph Dirrigl Jr, The University of Texas-Pan American*

The extensive stormwater canal system in Hidalgo County provides important fish and wildlife habitat. This system occurs in a rapidly growing area of urbanized, agricultural, and rural land management. The goals of our research were to: 1) gather data for surface water quality monitoring of the stormwater system supporting Edinburg, Texas, and 2) use this data to examine the potential effects of structural best management practices (BMPs) to maintain water quality. We report different gradients of physiochemical and nutrient water parameters existing along the canal segments analyzed. Implications for the management of stormwater canals based on our findings are presented.

104 - Barge impacts on Arroyo Colorado water quality *Evan Schauer, University of Texas Pan American; John Garcia, University of Texas Pan American; Diana Huallpa, University of Texas Pan American; Edwin Quintero, University of Texas Pan American; Hudson DeYoe, University of Texas Pan American*

The Arroyo Colorado is one of the most eutrophic waterways in Texas. Its main use is as a drainage canal for transmitting terrestrial runoff from Lower Rio Grande Valley to Lower Laguna Madre and as a port for barge shipments. The tidal segment of the Arroyo is nearly always stratified due to salinity differences of top and bottom water, the shape of the channel and lack of wind mixing. Fish kills are not unusual and are probably due to low dissolved oxygen and/or high hydrogen sulfide levels. We anticipated that barge traffic may mix the water column and have variable impacts on the aquatic community depending on the time of year. To assess the impact of barge-mediated mixing, we sampled the Arroyo during the summer and winter on days

that had no barge traffic and days that had barge traffic. Depth profiles of temperature, salinity, dissolved oxygen (DO) and pH taken and water samples were collected at discrete depths on four dates- 15 Aug 2013 (barge), 10 Sep 2013 (no barge), 13 Dec 2013 (no barge) and 19 Jan 2014 (barge). Barge passage partially mixed the water column but with devastating effects in Aug resulting low surface DO values and a fish kill. There was little barge impact on the biota in Jan mostly likely due to the less severe stratification and higher DO levels during this period. Nutrient and chlorophyll data will also be presented to describe the change in water quality conditions with barge mixing.

021-7. Terrestrial Ecology and Management Poster Session

Terrestrial Ecology and Management

Poster Session

Participants:

105 - Predator-Prey Interaction of Wolf Spider (*Lycosidae*) and Cricket (*Gryllidae*) in a Controlled Extreme Urban Environment *Angelica Torres, Department of Biology, Midwestern State University; Christopher James, Department of Biology, Midwestern State University; Collin Buerger, Department of Biology, Midwestern State University; Dale B. McDonald, McCoy School of Engineering, Midwestern State University; Michael M Shipley, Midwestern State University*

The mechanisms accounting for distributional and abundance patterns of arthropods that exist in urban settings is an entomological research topic that is largely unexploited. This baseline study on the interactions between a predator (wolf spiders) and their prey (field crickets) was performed in terraria with no soil or grass, creating an "extreme urban environment". Over 350 spiders were gathered at night from residential lawns using headlamps. Crickets were acquired from a local pet store. Control terraria had only spiders or only crickets, and experimental terraria had both in a 1:1 ratio. Numbers of both species were counted every 12 hours and observations regarding behavior were made on a daily basis. Control spiders decreased slightly after 20 hours due to cannibalism, while experimental pairings revealed a cricket population decrease that was well described by an exponential function of insect numbers over time. With this study it is hoped to gain further knowledge of the dynamics of interspecific interaction when natural resources are limited.

106 - A Test of the Relative Abundance, Diversity and Distribution of Ants at the Wild Basin Preserve in Relation to Habitat Manipulation for the Black-capped Vireo (*Vireo atricapilla*) *James Thomas LaManna, St. Edward's University; Kendra K. Abbott, St. Edward's University; Stephen Roberts, St. Edward's University*

Anthropogenic disturbances and land management practices are two factors that can impact species richness and evenness in a system. In this study, we examined how land management strategies for the endangered Black-capped Vireo, **Vireo atricapilla**, affected arthropod biodiversity at the Vireo Preserve in Austin, Texas. The Vireo Preserve serves as a critical habitat for Black-capped Vireo population recovery. By studying how land management activities affect arthropod communities, which in turn serve as food sources for the vireos, we can evaluate management strategies. To analyze arthropod diversity, ants were used as bioindicators due their diversity, abundance, and roles as keystone taxa in terrestrial ecosystems. Using pitfall sampling, epigeic ant species compositions in managed and unmanaged sites of an Oak/Juniper forest were compared using Simpson biodiversity indices. While arthropod diversity at the unmanaged site was greater than that of the managed site, other studies indicate that there has not been sufficient time for species populations to stabilize.

107 - Characterization of prey availability between Texas diamondback terrapin (*Malaclemys terrapin littoralis*) capture sites and background wetland densities *Bryan*

Alleman, University of Houston-Clear Lake/EIH; George Guillen, Environmental Institute of Houston

The diamondback terrapin (*Malaclemys terrapin*) is a species of turtle specialized for living in brackish and salt marsh environments. The Texas diamondback terrapin (*M. t. littoralis*) is the subspecies found along most of the Texas Gulf coast. Past studies have been conducted on prey availability of diamondback terrapin, but these studies primarily occurred along the Atlantic Coast. There is currently a paucity of data on the diet of this species along the coast of the Gulf of Mexico, and specifically on the Texas Gulf Coast. This study examines the prey availability of the Texas diamondback terrapin. Terrapin were captured by hand from marshes along the Texas Gulf coast. Field data were collected at each capture site and a nearby, randomly selected control site including: location, time, and vegetation data (species composition; density; height within a 1m²- square quadrat). Potential prey items (*Uca* spp. burrows; *Littorina* snails; etc.) were also counted within the 1m²-square quadrat at these sites. By examining these data, some important questions concerning the ecology of this unique species are answered, such as how available prey influences habitat selection. Locations where terrapin were captured are hypothesized to have differences in prey availability than the locations of randomly selected control sites. This information will be compared with actual prey consumption in the near future to evaluate potential prey selectivity by terrapin.

108 - Does urbanization explain preferential use of alarm calls by Carolina Wrens, *Thryothorus ludovicianus*? *Michelle Yvonne Mullan, Sam Houston State University; Diane Neudorf, Sam Houston State Univ.*

Habitat loss, anthropogenic noise, and other human effects have placed selection pressures on auditory signaling of animals. Many studies have examined geographic variation of bird song between urban and rural environments. However, few studies have examined the effects of urbanization on avian alarm calling. Preferential use of alarm calls by Carolina Wrens, *Thryothorus ludovicianus*, has been observed in urban and rural locations of Huntsville, Texas. Those inhabiting urban areas tend to use *cheer* calls, while those of the rural biological field station of Sam Houston State University tend to use *ti-dink* calls. We hypothesized that habitat plays a role in their preferential use of alarm calls. Therefore, we predicted Carolina Wrens of other urban environments would use *cheer* calls and those of rural environments would use *ti-dink* calls. To test this, we surveyed urban and rural locations of Huntsville and three surrounding cities and documented the approximate locations using Google Maps. The results indicated that a geographic variation exists in the alarm calling of Carolina Wren, but the hypothesis was not supported. While *cheers* were slightly more prevalent in urban areas and *ti-dinks* slightly more prevalent in rural areas, there was no statistical support of the data.

109 - The characterization of shrub density and grass cover in South Texas coastal prairies and the relationship between shrub disturbance and treatment methods on grass regeneration *Parker Watson, University of Texas at Brownsville*

Coastal prairie ecosystems of South Texas are experiencing aggressive encroachments of native "invasive" shrubs such as honey mesquite (*Prosopis glandulosa*). When these species become established, they dominate space previously used by native prairie grasses such as Gulf cordgrass (*Spartina spartinae*). Because shrubs create a bare area in their immediate understory, the areas occupied by the native "invasive" shrubs tend to display an inversely proportional relationship between grass cover and shrub density. This is significant because the coastal prairie is habitat for rare and endangered animal species such as the Aplomado falcon (*Falco femoralis*). The purpose of this experiment is to characterize the microclimate and vegetation dynamics of shrub understories across a shrub density gradient, and to assess the relationship between native prairie grass

recovery processes and the use of different shrub removal and restoration methods. It is expected that the mechanical removal of shrubs followed by fire will be the most efficient means for grass regeneration and, therefore, the most efficient method for coastal prairie restoration.

021-8. Physics Poster Session

Physics

Poster Session

Participants:

- 110 - Analysis of Lorentzian peaks in atomic absorption spectra and shapes of glowing objects from the polarization of light emitted *Sara-jeanne Elizabeth Vogler, Lamar University; Keeley Townley-Smith, Lamar University; James Fairchild, Lamar University; Cristian Bahrim, Lamar University*

A medium which is traversed by light absorbs only the characteristic wavelengths, otherwise it is transparent. We use knowledge from measurements of the emission lines of pure atomic and molecular spectra used in labs for the identification of absorption lines embedded in the blackbody spectrum of Sun. Both the absorption and emission lines have a Lorentzian profile with a width associated to the lifetime of the excited states in given conditions. Knowing the composition of the Earth's atmosphere and the composition of the different layers of the Sun's atmosphere along with the temperature of the Sun's photosphere, 5778 K, the absorption spectrum of the Sun's light near the Earth's surface can be numerically simulated with MatLab®. The record and interpretation of the absorption spectra of dominant gaseous components of the Earth's atmosphere imprinted in the Sun's emission spectrum is our final goal. As our Sun is a nearly spherical blackbody source, it uniformly emits light in all directions. It has been theorized by a relatively recent article by R. Cowen published in the Science News (2006) that a blackbody source of a non-spherical shape will emit light of different intensities in different directions. We test this hypothesis using various shaped openings and a blackbody light source in a laboratory environment. The light from a non-circularly shaped source can be polarized and the intensity can be recorded. We discover the shape of the light source from the change in intensity, while the polarizer is rotated in front of the light detector.

- 111 - Determination of Spectral Frequencies in G2938 *John McClain, Temple College*

White dwarf (WD) stars are among the easiest stars to study. While the mass of a WD is comparable to that of our Sun, its size is only about that of Earth. They are the final state for stars with insufficient mass to collapse through the electron-degeneracy limit. The first WD star was discovered by Herschel in 1783 [1]. The nearest WD, Sirius B, was first observed by Clark in 1862 [2]. Zuckerman and Becklin [3] discovered that WD G2938 had pronounced IR excesses which were claimed by Reach [4] to be the result of silicate dust in an accretion disk. WDs with temperatures 25,000 K and less have a relationship between accretion and their photospheres [5]. G29-38 is a pulsating WD in which luminosity varies by over 30% [6]. It is possible to determine the spread of metals across the surface of the star by examining these pulsations [7]. Our part is to aid in this process by determining the frequencies of the pulsations using Period04 [8], a software package specifically designed to statistically analyze large astronomical time series containing time gaps. The data used in our analysis was obtained from the Whole Earth Telescope (WET) [9], a network of observatories, of which the Central Texas Astronomical Society [10] is a member, which work in consortium to observe and record data. The data for G2938 was reduced by the Delaware Asteroseismic Center [11] which now administers WET. Our results will be used by University researchers to help determine the distribution of calcium in G2938.

- 112 - Gear Based Quasi-Continuous Variable Transmission (QCVT) *Dania Wilson, McCoy School of Engineering, Midwestern State University*

This research project explores the possibility of increasing the amount of energy harvested by wind turbines by taking advantage of higher wind speeds. A gear based active discrete variable transmission allowing a variable speed at the input shaft and delivering a quasi-constant speed at the output shaft is currently being designed. The system consists of a special assembly of spur gears run and controlled manually through a set of gear shifters. The system acts as a Quasi-Continuously Variable Transmission (QCVT) between the wind turbine hub and the electricity generator which requires an entry speed corresponding to a frequency of 60 Hz. The gearing system is designed using the SolidWorks CAD software for modeling and simulation. The gearing design theory is used to dimension the required spur gears. Betz's law associated with appropriate wind turbine efficiency is used to estimate the wind power transferred to the turbine hub. The law is also used to determine the hub angular speed as a function of the wind speed. The kinematic gearing theory is used to establish the gearing ratios of the system. The forces and torques acting on and within the system are computed using a set of equilibrium equations. It is expected that the totality of the harvested power is transmitted through the QCVT system through the QCVT system with some energy losses due to gearing friction. through the QCVT system with some energy losses due to gearing friction. through the QCVT system with some energy losses due to gearing friction. through the QCVT system with some energy losses due to gearing friction.

- 113 - Radio Astronomy at the Mars Desert Research Station *Kyle Lee Flaherty, McLennan Community College*

Radio astronomy is a crucial method for observing solar activity and celestial events. R.A.A.M will cover the application of radio astronomy in a Martian environment with a focus on the hardware. Radio astronomy could be useful to a manned mission on Mars by providing a way to monitor solar activity, and a different view point to supplement Earth based observation. Initially industrial and commercial equipment was analyzed for its use in the context our research. After the initial research was complete, existing equipment was to deliver the lowest total noise figure and highest resolution. At the Mars Desert Research Station the equipment was tested for quality and physical resiliency.

023. Graduate Panel Discussion

Texas Academy of Science Annual Meeting

Special Event

7:00 to 9:00 pm

Classroom Lab Building: Floor 1 - 100

Participant:

Graduate Student Panel *Danette Rene Vines, Schreiner University*

This panel will be comprised of a number of graduate students of different degrees and time towards degree completion. The panel is designed for undergraduate and graduate students to learn from their peers about the issues and concerns one should think about when going to graduate school. What better way to learn than through others' experiences? Along that note, we encourage students of all levels to attend and discuss the world of graduate school and academic with their peers.

024. How to Find Your Dream Sciences Job

Texas Academy of Science Annual Meeting

Special Event

7:00 to 9:00 pm

Ocean & Coastal Studies Building: Floor 1 - 142

Your presenter will be Joe Beach, PHR, Human Resources, Texas Parks and Wildlife. Joe is a wildlife biologist and geologist as well as human resources professional. Joe will prepare you to: Master the details of exploring, assessing and conducting your job search; Maximize your chances of being interviewed; Know how to handle some of the major job interview scenarios; Complete federal, state and other governmental applications as well as craft a resume and effective cover letter; Identify

and select the best job websites, personal and community resources for your search; Negotiate salary/benefits and evaluate offers; and more! Please RSVP with Marsha may at marsha.may@tpwd.texas.gov or 512-389-8062.

Participant:

How to Find Your Dream Sciences Job *Joe Beach, Texas Parks and Wildlife*

SATURDAY, MARCH 8

026. Chemistry and Bio-Chemistry I

Chemistry and Biochemistry

Paper Session

8:30 to 9:45 am

Classroom Lab Building: Floor 1 - 103

Participants:

114 - Computation of homogeneous azeotropes by the Wilson activity model for the ethane-trifluoromethane binary system. *Nilan Jayabahu Kamathewatta, Sam Houston State University; Darren L Williams, Sam Houston State University*

The determination of the existence and composition of azeotropes is important both from theoretical and practical aspects. Finding azeotropy by experiment is usually expensive and time consuming. A reliable theoretical method will narrow the experimental search and reduce the cost. In this process, the Wilson equation is used to find the activity coefficients of binary vapor-liquid equilibrium systems. The Antoine equation is used to determine the saturated vapor pressure of individual components in a system. A single set of vapor liquid equilibrium data (VLE) that is total vapor pressure, molar fractions in liquid phase and vapor phase can be used to calculate the Wilson parameters if they were unavailable. Also the Wilson parameters can be related to molar volume and the Hansen solubility parameters. Here in this method the ethane:trifluoromethane system has been used to calculate the above Wilson parameters and the azeotropic point was calculated by using Newton's method. In future work, the relationship of the Wilson parameters to the Hansen solubility parameters will be explored. Preliminary findings will be presented in this talk.

115 - Development of accurate computational methods for predicting the color of nitroaniline *Nathan Cale Baker, Sam Houston State University; Darren L Williams, Sam Houston State University*

1,3,5-Triamino-2,4,6-trinitrobenzene (TATB) shifts from a yellow color to green when irradiated by wavelengths under 420 nm. It was predicted that one of the degradation products resulting from photolysis displays this green color and could subsequently be pinpointed through the analysis of simulated spectra methods using Gaussian 03W. Since TATB is insoluble, 2-, 3-, and 4-nitroaniline were used to justify a level of theory, basis set, and UV/Vis calculation that best matched experimental results. The three isomers of nitroaniline were chosen due to their known spectra and known structures. The B3LYP functional was retained throughout the analysis while basis sets were systematically expanded to include additional polarization functions on light and heavy atoms, as well as to include diffuse functions. The functional and basis sets were used to optimize the isomers' geometries and calculate the frequencies of each vibrational mode, whereupon the spectra were obtained on these final geometries using ZINDO, TDDFT, and CIS calculations. However, the resulting spectra of each simulated UV/Vis calculation showed differences in color within each species. The colors were able to be matched between ZINDO and TDDFT by normalizing the oscillator strength of the first transition of each species. The spectra obtained from using the CIS calculation resulted in no observable color. These results led to a new

hypothesis which is currently under investigation: by breaking the symmetry of the modelled molecule and obtaining a new simulated UV/Vis spectra, transitions that were previously forbidden by symmetry rules become allowed and thus color may be observed.

116 - FT-NMR in a shoebox 45 and 82 MHz bench top NMR for students *Cameron Macisaac, Thermo Scientific, Inc.* Fourier Transform (FT) Nuclear Magnetic Resonance (NMR) Spectroscopy is a powerful analytical technique but one of the more expensive and difficult tools to support. Recent changes in technology such as powerful, light weight, magnetic materials, advanced micro-coil manufacturing techniques, and improved radio frequency (RF) electronics have made miniature NMR spectrometers possible. These advances have enabled an elegant NMR design with a footprint roughly the size of a shoe box that uses no cryogens, NMR tubes, or compressed gases and only requires standard 110V power. This paper will present several new end-user markets and illustrative applications for which "shoe-box" size 45 and 82 MHz miniature NMR spectrometers are now routinely being utilized.

117 - Rotational selection rules defined by symmetry, based on the particle on a ring method *Victoria Spenn Jackson, Sam Houston State University; Darren L Williams, Sam Houston State University*

The particle in a box and particle on a ring are pedagogical methods used for understanding theoretical electronic and rotational transitions within a molecule. The occurrence of transitions are calculated analytically, numerically, or based on symmetry. In these techniques, electronic movement is described by wavefunctions that each display an observable symmetry. Allowed electronic transitions are found simply based upon the odd or even symmetry of the wavefunctions involved, which propagates the selection rules for electronic transitions. Using this same symmetry method, the rotational selection rules cannot be correctly determined. This talk will cover the way to properly distinguish the rotational selection rules defined by symmetry using the particle on a ring. This method will determine the point group of the ring to which the wavefunctions are constrained, and delineate the irreducible representations that classify symmetry for each rotational energy level. In using these newly determined classifications, the selection rules will be rendered purely based on symmetry.

118 - The study of miscibility in the replacement of AK-225 in industrial cleaning applications *James Huskey, Sam Houston State University; Darren L Williams, Sam Houston State University*

Solvent replacement for industrial cleaning applications is in demand as ozone-depleting solvents are being phased out. A widely-used industrial cleaning solvent is Asahiklin® AK-225 and was a replacement for a previously banned solvent but now has a phase-out date of January 2015. One way to replace a solvent or solvent blend is to locate a solvent or blend with similar solvation abilities as characterized by solubility parameters. The Hansen solubility parameters (HSPs) have proven themselves to predict blend solvation character but not blend miscibility. The Godfrey miscibility index (M-number) is a miscibility ranking of over 400 solvents. To date, there has not been a thorough exploration of the relationship between the HSPs and Godfrey's M-numbers. A theoretical approach to predicting the miscibility of blend components will be studied, and the connection of Godfrey's M-numbers to the HSPs will be presented in a quantitative structure property relationship (QSPR) between HSPs and Godfrey's M-numbers. The QSPR will enable solvent blend miscibility to be modeled using an HSP database of over 10,000 solvents and help predict solvent blend miscibility without the requirement of costly trial and error benchmark.

027. Systematics and Evolutionary Biology II

Systematics & Evolutionary Biology

Paper Session

8:30 to 9:45 am

Ocean & Coastal Studies Building: Floor 1 - 141

Participants:

- 119 - Do socially dominant males choose larger females in *Gambusia affinis*, the western mosquitofish? *Natalie Willard, St. Edward's University; J. Alex Carr, St. Edward's University; H. Evans, St. Edward's University; Raelynn Deaton Haynes, St. Edward's University*

Theory predicts that larger (or dominant) males should choose higher quality females. Therefore, we tested the hypothesis that socially dominant males would prefer to mate with larger females in two species of livebearing fishes that differ substantially in mating strategies (courting guppies and coercive mosquitofishes). This prediction relies on the assumption that larger females are more fecund, and thus afford males higher reproductive success. In a series of three consecutive behavior experiments, we first established social dominance. Assuming dominant males were larger and/or showed higher frequency of matings, we then tested whether each male in social groups (x3) preferred larger females in both dichotomous and open choice experiments. All males preferred larger females, regardless of social dominance in both dichotomous and open water trials. We then tested whether males that ranked second in dominance would shift their behaviors according to the size of their competitor. Thus, half of the males were tested against larger competitors and half against smaller competitors. Number 2 ranked males (medium-sized) exhibited a higher frequency of display behaviors, but not copulation attempts, toward larger females, but only when the competitor was smaller. These results are surprising in that they suggest that males shift courtship but not coercive behaviors in the presence of smaller, sneaky males, which may present more of a threat than larger males. A more robust sample size needs to be tested to draw definitive conclusions from these results.

- 120 - Effects of AVT exposure on female-female aggression in *Syngnathus scovelli*: a sex-role reversed species *April Navarro, St. Edward's University; Tamara Fraker, St. Edward's University; Sunny Scobell, Brooklyn College; Raelynn Deaton Haynes, St. Edward's University*

Examining sex-role reversed behaviors provides a unique opportunity to test sexual selection theory and to further our understanding of the neurophysiology mediating behavioral sex differences. Sex-role reversal is characterized by increased male parental investment and females competing more intensely for mates. Syngnathids (seahorses, pipefish, and seadragons) are a useful group for studying neural systems underlying sex-typical behaviors as this family displays both conventional and sex-role reversed mating systems. A key neuropeptide mediating social behavior, arginine vasotocin (AVT, the homologue to the mammalian gene arginine vasopressin, AVP), has been the topic of recent research. AVT/AVP facilitates social behavior across all vertebrate taxa (i.e. birds, amphibians, fish, rodents, mammals). In many male vertebrates, AVT/AVP mediates aggressive behaviors. Currently there is paucity of research assessing AVT's effect on aggressive behaviors in sex-role reversed systems. The goal of this research is to understand the role AVT plays in the mediation of aggression in sex-role reversed *Syngnathus scovelli* (Gulf pipefish). During a baseline test for behavior, test females interacted with a size-matched stimulus female. The test female then received either a saline, sham, AVT, or Manning Compound (MC, an AVT antagonist) injection. The pair then partook in a post-injection test. Behavioral data suggests that MC females spent less time interacting with their partner than saline females. Further, AVT females tended to darken their melanous dorsal fin significantly more than MC females. This darkened dorsal fin is a part of the pipefish courtship and competition repertoire and may be viewed as an indicator of aggression.

- 121 - Predictors of social dominance in two species of livebearing fishes that vary in mating strategies *H. Evans, St. Edward's University; J. Alex Carr, St. Edward's University; Natalie Willard, St. Edward's University; Raelynn Deaton Haynes, St. Edward's University*

The objectives of this study were to determine social rank of males in two species of livebearers that differ in mating strategies. We measured both aggression and mating as potential predictors of social dominance and sought to determine whether male aggression is correlated with mating success over time. We created dominance hierarchies for 60 male guppies (20 groups of three) over two weeks. In guppies, social dominance was driven mainly by male mating behaviors, and not aggression, as previously suggested. We measured male body size and calculated the ratio of orange and black pigmentation to the total body surface area. We found that aggressive behavior is predictive of male mating behavior and that a high ratio of black pigmentation is predictive of aggressive behavior. For mosquitofishes, standard length is the most important predictor of male mating and aggression. Similar to guppies, however, male mating behaviors are more important than aggressive behaviors in establishing social dominance. For both species, it appears that the dominance hierarchy is established immediately, and not over time. Our results are novel in that we explored both aggression and mating as potential correlates of social dominance, where past studies have looked mainly at aggression. Since male guppies are less aggressive than are mosquitofishes, and larger mosquitofishes typically outcompete smaller males; our results are not surprising. We also will report on two follow up experiments that replicated methods described here to determine if formation of social dominance hierarchies is repeatable.

- 122 - The gonopodial display: linking function and behavior in a coercive livebearing fish *Lan-Anh Van-Dinh, St. Edward's University; Raelynn Deaton Haynes, St. Edward's University*

Livebearing fishes offer a unique model system for studies in sexual selection because they show a wide range of male behaviors that directly influence male reproductive success. Male *Gambusia affinis*, the western mosquitofish, exhibit courting behaviors to obtain mates, such as the gonopodial display in which males lower a modified fin (gonopodium) at different angles to their body to transfer sperm to females during copulation. During mating, males often exhibit two types of displays by lowering the gonopodium to 90° (perpendicular to the body) and to 180° (parallel to the body). The 90° display is a behavior thought to function in courtship towards females and aggression towards males. Males rarely exhibit the full 180° display to other males, which may signify a different function such as sperm priming. We tested the hypothesis that the 180° gonopodial display behavior in male western mosquitofish functions as a sperm priming mechanism. We measured sperm counts of males and observed male mating behaviors towards females in an open water design, quantifying the frequencies of both 90° and 180° display behaviors and mating attempts. During behavioral trials, we found that the frequency of the 90° display predicts the sperm counts after introduction of females. We found significant differences between sperm counts across experimental days suggesting that males produce more sperm in the presence of females. Results suggest that the 180° degree display behavior does not appear to further increase sperm priming as expected.

- 123 - Preliminary Results On The Potential Use Of Gamma-Ray Spectrometry To Determine The Absolute Age Of Fossils *George Irwin, Lamar University; Christine Michelle Gartner, Lamar University; James Westgate, Lamar University*

Uranium ions have similar ionic radii to calcium ions and readily substitute in the bioapatite crystal structure of bones. Geochemical substitutions in bioapatite require that uranium is introduced shortly after post-mortem, enrichment occurs early in diagenesis, and the bioapatite remains a closed system with

respect to uranium throughout geologic time. The purpose of this research is to determine the absolute age of radioactive fossils ranging from 13,000 YBP- 54 MYBP. Most techniques to radiometrically date fossils requires the partial destruction of specimens and are often time consuming and expensive. Our team is working towards developing a new application of gamma-ray spectrometry to non-destructively determine the absolute age of fossils with known radioactivity. The specific focus is on the isotopes 235U and 238U and various daughters including 224Ra, 226Ra, and 214Pb. A new technique of pulse height analysis will be applied to the gamma-ray spectrum produced by each specimen. Preliminary analysis of pulse height ratios indicate a nearly linear graph is produced when the areas of peaks corresponding to daughter isotopes are added together, compared to the areas under peaks corresponding to parent isotopes, and plotted against logarithmic values of age. The peaks from 13,000 YBP to 54 MYBP change consistently and shows phenomenologically that the various spectra serve as an indicator of time, and theoretically can produce estimate age dates.

028. Terrestrial Ecology and Management III

Terrestrial Ecology and Management

Paper Session

8:30 to 9:45 am

Ocean & Coastal Studies Building: Floor 1 - 142

Participants:

124 - A serologic survey of coyotes (*Canis latrans*) for canine distemper in the trans-pecos region of Texas *John Timothy Stone, Sul Ross State University; Chris M Ritzi, Sul Ross State University*

The Canine Distemper Virus is a viral agent of concern that is currently affecting populations around the globe. While research concerning distemper has increased abroad, domestically few surveys for distemper have been completed in the past 20 years. Studies within this time have shown seroprevalence rates for distemper in South Texas to approach 90%. The TransPecos region of Texas contains some of the highest rates of carnivore diversity, but little is known about the rates of canine distemper for this region. This project seeks to obtain baseline levels for seroprevalence of canine distemper for coyotes (*Canis latrans*) in the Marfa plateau region of the Trans-Pecos. This survey will be accomplished by working cooperatively with predator hunters in the area. Collected serum samples will be processed and analyzed via ELISA testing. The results of this work will provide information on distemper prevalence and possible threats to predator biodiversity in this area.

125 - Assessing capture success of small mammals due to trap orientation in habitats of field-forest edge *Daniel M. Wolcott, Texas State University; Madison R. Ackerman, University of Memphis; Michael L. Kennedy, University of Memphis*

The prediction that there is no differential capture success of small-nonvolant mammals in habitats of field-forest edge due to trap orientation (opening of the trap facing toward the field or toward the forest) was tested during late May and early June 2010. Transect sampling utilizing Sherman live traps baited with rolled oats was conducted at 3 locations in western Tennessee. Traps were placed in pairs along transects in edge habitats with the orientation of one trap facing outward, toward the field, and the other oriented inward, toward the forest. Logistic regressions were used to assess possible differences in trap orientation. With 10,216 trap nights, 408 individual small mammals (191 males and 217 females; representing 6 species) were captured a total of 480 times. Results reflected no differential capture success due to trap orientation among ages, sexes, species, or location. Our findings suggest that the orientation of the trap in edge habitat of fields and forests make little difference in the capture of small mammals. Given such results, we note that facing trap openings toward the field will likely minimize trapping effort associated with checking and rebaiting traps. This finding should facilitate

the inventory and monitoring of small mammals in an abundant and potentially species rich habitat in many terrestrial regions.

126 - Sabal palm's safety net: coyote's balancing interaction on seed predators *Guillermo Aguilar, University of Texas-Brownsville; Alejandro Fierro-Cabo, University of Texas-Brownsville*

Benefits of frugivory for the plant partner usually include seed dispersal and seed coat scarification. In deep south Texas, a peculiar interaction between the native sabal palm (*Sabal mexicana*) and the opportunistic coyote (*Canis latrans*) includes the dispersal and easier germination benefits, but possibly also a much needed protection from seed predators. A series of germination tests, camera trap surveys and a coyote scat survey were conducted in order to explore both sides of this interaction. Preliminary results show an improved and faster germination of seeds collected from coyote scats. In addition, seeds in scats were effectively protected from seed beetle (*Caryobruchis gleditiseae*) oviposition, and consumption from seed destroying predators such as raccoons and rodents. An ongoing scat survey will help determine the importance of palm fruit in the coyote's diet. Results suggest the interaction of the palm with its seed disperser/protector balances the effect of seed predators.

127 - Wildlife Species Associations at Future Wildlife Crossing Locations in South Texas *Sarah E Nordlof, The University of Texas at Brownsville; Richard Joseph Kline, University of Texas at Brownsville*

Habitat destruction and fragmentation are two of the largest threats to wildlife habitat in South Texas. Maintaining connectivity of fragmented habitat plays a key role in the management of wildlife in the United States. Wildlife crossings are one of the most efficient strategies to combat fragmentation of habitat. Widening and installation of wildlife crossings on Farm-to-Market Road 106, a rural road with moderate human disturbance near Laguna Atascosa National Wildlife Refuge, is planned for 2014. Camera traps were used to analyze ocelot (*Leopardus pardalis*) and bobcat (*Lynx rufus*) use of habitat at future wildlife crossing locations to test the hypothesis that presence of certain wildlife species and habitat characteristics can predict ocelot and bobcat presence. The wildlife crossing sites were compared to reference sites with minimal human disturbance. Sites were characterized by species presence and habitat characteristics in order to develop a predictive model for ocelot and bobcat presence. The results of this study will aid in decisions for placement and enhancement of future wildlife crossings in a human-dominated landscape.

128 - The Herps of Texas Project - status of compilation, standardization of museum-vouchered herp data, online database, and related research *Travis J LaDuc, University of Texas at Austin; Ben Labay, Texas Natural History Collection, University of Texas Austin*

Significant changes in human population size and concomitant habitat modifications continue to impact flora and fauna of Texas. These impacts are difficult to track because of the diversity of species involved and the lack of quality specimen- and population-level occurrence data. Records from natural history museums are the most authoritative documentation of the spatially and temporally dynamic distributions of organisms, and thus extremely valuable for research on relationships between organisms and environments. The objectives of our initial four-month project was to supply standardized and georeferenced occurrence data to the Texas Natural Diversity Database (TXNDD) for Texas reptile and amphibian species, including species listed or tracked by the TXNDD and the Texas Parks and Wildlife Department, across 41 south Texas counties. Records were based on museum voucher specimens deposited in the Texas Natural History Collections (UT-Austin). Locality information for >5400 specimens, comprised of 121 species, was georeferenced using established protocols. Additionally, for select taxa, we used these data to create preliminary species distribution models and mapping products for applications in

conservation planning. This project was the first step towards a larger goal of addressing all herpetofaunal species in Texas by gathering all records of Texas reptile and amphibian specimens deposited into natural history collections around the world. The creation of the Herps of Texas database will provide a centralized clearinghouse of Texas herpetological distribution records and address the needs of State and Federal management agencies in their mandate to collect and synthesize all available species data.

029. Conservation Ecology II

Conservation Ecology

Paper Session

8:30 to 9:45 am

Powell Marine Engineering Complex: Floor 1 - 145

Participants:

129 - Analysis of Archaea Soil Microbiome and the Impact of Black Capped Vireo Habitat Restoration Efforts *Dylan Fox, St. Edward's University; Laurie Cannon, St. Edward's University; Lisa O'Donnell, City of Austin, Balcones Canyonlands Preserve; Charles Hauser, St. Edward's University*

Plants associate with root microbiota distinct from microbial communities present in surrounding soil. The microbiota colonizing the rhizosphere (immediately surrounding the root) contribute to plant growth, carbon sequestration and phytoremediation. Here we report the pyrosequencing of the archaea and a subset of eubacterial 16S rRNA genes of soils from two positive control sites and three habitat restoration sites within the Vireo Research Area (West Austin Macrosite) and Wild Basin Wilderness Preserve to test the hypothesis that soil remediation treatments can establish microbial communities to those characteristic of black capped vireo habitat. The three habitat restoration sites consist of 5 mulch sock treatments: 1) control treatment (mulch socks only); 2) onsite mulch (juniper and hardwoods); 3) onsite composted mulch (juniper and hardwoods); 4) Mulch and biochar combined; 5) composted mulch and biochar combined. Using primers designed to amplify archaea (archaea349F, 806R) we have identified 811 taxa, of which 96 (11.8%) were assigned to archaea, and 715 (88.2%) were assigned to eubacteria using QIIME and the Greengenes database. Principal coordinate analyses of the archaea taxa employing both weighted (based on abundance) and unweighted (sensitive to rare taxa) UniFrac distance metrics suggest that the majority of the variation (PC1) in archaea diversity can be attributed to sampling time, whereas soil remediation treatment explains the second most variation in the samples (PC2). Data from the control sites are currently being sequenced. The results of this research will hopefully provide insights into a wider scope of ecological restoration strategies using soil restoration treatments.

130 - Using integrated population models to estimate immigration rate for golden-cheeked warblers *Adam Duarte, Texas State University; Floyd W. Weckerly, Texas State University; Jeff S. Hatfield, USGS Patuxent Wildlife Research Center*

An understanding of population dynamics is fundamental to species' conservation and management. As a consequence, since the golden-cheeked warbler (*Setophaga chrysoparia*) was first listed as endangered efforts have sought to monitor warbler abundance, occupancy, reproduction, and survival. Yet, movement rates (i.e., immigration or emigration) have not been estimated for the species despite being directly related to local population growth rates. We explored the use of integrated population models for golden-cheeked warbler monitoring programs. Specifically, we integrated fifteen years of spot-mapping and fledgling count data collected on the Balcones Canyonlands Preserve with survival estimates calculated from twenty years of capture-recapture data on the Fort Hood Military Reservation to monitor warbler immigration rate, productivity, and population growth rate, simultaneously. The results indicate

that the warblers had an overall positive population growth rate across years ($\lambda = 1.07$ [CRI: 1.03-1.12]). The mean immigration rate was 0.41 (CRI: 0.33-0.49), indicating that for every five individuals in the subpopulation in year t , there will be roughly two immigrants in year $t+1$. Productivity was approximately 1.43 (CRI: 1.34-1.53) fledglings per warbler territory. Thus, in the absence of immigration warbler abundance would have declined strongly, otherwise the other vital rates would have had to increase to unrealistic values for the species to maintain a stable subpopulation. Collectively, this indicates immigration is critical for local persistence of warblers and that warbler conservation and management strategies need to be implemented at the landscape, rather than local, scale in order to be effective in maintaining viable warbler subpopulations.

131 - Soil Eubacterial Metagenomics: Implications for Native Plant Restoration at the Black Capped Vireo Research Area and Wild Basin Wilderness Preserve *Laurie Cannon, St. Edward's University; Dylan Fox, St. Edward's University; Lisa O'Donnell, City of Austin, Balcones Canyonlands Preserve; Charles Hauser, St. Edward's University*

Bacterial communities associated with plant roots are essential to host survival and propagation. However, a robust model of the root-microbiome and the factors that drive host associated microbial community structure is poorly defined. Here we investigated the impact of soil restoration treatments, aimed at establishing black-capped vireo habitat within the Vireo Research Area (West Austin Macrosite) and Wild Basin Wilderness Preserve, on soil bacterial communities. Using pyrosequencing of bacterial 6S rRNA genes, we profiled soil microbial populations from established vireo habitat control sites, and vireo habitat restoration sites. The three habitat restoration sites, characterized by Glen Rose soils, consist of 5 mulch sock treatment areas: 1) control treatment is mulch socks only; 2) onsite mulch containing local juniper and hardwoods; 3) onsite composted mulch containing local juniper and hardwoods; 4) Mulch and biochar combined; 5) composted mulch and biochar combined. The hypothesis was that bacterial population diversity would reflect each treatment and that 'signature' operational taxonomic units (OTUs) would be identified for each treatment. Our preliminary analyses have identified a total of 1982 OTUs present in the treatment site samples. We used weighted (based on abundance) and unweighted (sensitive to rare taxa) UniFrac distance metrics to estimate β -diversity. Preliminary principal component analyses (PCoA) of both UniFrac distances revealed that the majority of the variation in eubacterial diversity can be attributed to soil restoration treatment. The results of this research will hopefully provide insights into a wider scope of ecological restoration strategies using soil restoration treatments.

132 - Climate change effects on the distribution of twelve endemic lizards, of the genus *Plestiodon*, of Mexico *Mayra Oyervides, University of Texas-Pan American; Rogelio Cazares, University of Texas-Pan American; Manuel Feria, Museo de Zoología, Facultad de Estudios Superiores Zaragoza, Universidad Nacional Autónoma de México; Teresa Patricia Feria, University of Texas-Pan American*

Climate-limited species are shifting their native ranges due to global warming. Erosion of lizards has been dramatically documented for Mexico, the country with the highest richness of reptile species, due to changes in temperatures. However, for many of these organisms, such as the Brevirostris group of *Plestiodon* lizards, which are endemic to Mexico, little is known concerning the potential impacts that climate change can have on their populations. We predicted present and future potential distribution of twelve species of *Plestiodon* genus by correlating geographic information with climatic variables using a maximum entropy approach. We used the IPCC A2a scenario and four GCM (general circulation models) with data available for the year 2050 at the Agriculture and Food Security (CCAFS) spatially downscaled using the Delta Method: CCCMA-CGCM2, CSIRO-MK2.0, UKMO-HADCM3, and NIES99. Geographic

information was gathered from online databases, literature, and field work. Results suggest that climate change will negatively affect the distribution of most species by contracting their potential suitable habitat. Future research should include a detailed study of the natural history of these species in order to help prioritize future conservation efforts to protect them.

- 133 - The effects of urbanization on physiological stress of Jollyville Plateau salamanders, *Eurycea tonkawae* Drew R Davis, University of South Dakota; Nathan F Bendik, City of Austin; Kristina Zabierek, Texas State University; Caitlin Gabor, Texas State University-San Marcos

Jollyville Plateau salamanders (*Eurycea tonkawae*) are aquatic salamanders endemic to two highly populated counties in central Texas. Much of the species' range has been negatively impacted by anthropogenic disturbance, exhibiting low population densities and declining trends in heavily urbanized watersheds. Gross changes in water chemistry have occurred in these areas due to the release of pollutants from a wide variety of sources associated with urbanization. At the same time, increases in flash flooding and sedimentation have altered the physical environment. Assessing stress levels in field-caught animals may provide important insights into population health. Using a recently developed technique to evaluate water-borne stress hormone levels, we compared corticosterone (CORT) levels of salamanders across populations in two urbanized and two non-urbanized sites. We found that salamanders from urbanized sites had significantly higher CORT levels than salamanders from non-urbanized habitats. Our results indicate that anthropogenic disturbance may be contributing to elevated CORT levels in populations of *E. tonkawae*. Further evaluation of stress hormone levels in *E. tonkawae* may help elucidate the mechanistic link between the urban stream syndrome and population declines in this federally threatened species.

030. Science Education III

Science Education

Paper Session

8:30 to 9:45 am

Powell Marine Engineering Complex: Floor 1 - 146

Participants:

- 134 - How a Week Long Summer Program Increases Elementary Students' Motivation in Science? Mamta Singh, Martin University

Summer Science, Technology, Engineering, and Mathematics (STEM) Camp started on June 23rd 2012 and ended on June 29th 2012. It was a two weeks long summer NASA STEM camp for entering 4th grades up to entering 6th grade. The content covered was all NASA STEM focused embedded with cooperative learning and project based learning approaches. A total of 70 fourth-six grades students participated in the summer program. Students were introduced with process of science and scientific method in each of their summer activities. They were challenged to use their critical thinking skills to design their projects. They used different variables to analyses their results and discuss their findings and finally present their findings to their peers, instructors, and parents. 76% student participants indicated that summer STEM program increased their interest in science; 50% student participants indicated that participation in summer STEM program led to increase interest in science career. 50% student participants reported that as a result of participation in summer STEM program, they were more confident in doing science and math at my school. 70% student participants indicated that summer STEM has inspired them to learn more about math and science. 70% participants indicated summer STEM was a good investment of their time

- 135 - Informal Learning Environment: Summer Outdoor Experience Mamta Singh, Martin University

Humans learn many things for many reasons and in many different ways. Just telling someone to learn to read, memorize the facts, finish homework, pass the exams will not make them

learn. Or just telling them to not to learn will also not prevent them from learning. We educators must make learning, especially science learning fun and experiential. The purpose of this field trip was to give students outdoor science experience to expose them to a space learning environment outside the laboratory setting. This field trip was organized through community and university partnership in the summer of 2011. Sixty-five, third-fifth grade students along with their parents participated in the field trip. Results suggested that 49.15% student participants indicated that they have never visited a state park before this filed trip. 90% of student participants indicated that the Spring Mill State Park filed trip was a great experience for them. 50% student participants indicated that the Nature Center activity was their most favorite activity. 38.3% student participants indicated that they have never seen a space capsule or space suite before this filed trip.

- 136 - Impacts of Active Learning on Higher-Order Thinking in a Physical Geology Class Carol Thompson, Tarleton State University

Like many schools, introductory science classes at Tarleton State University are taught in large lecture halls designed for lecturing. These courses usually have high D-F-W rates and intentionally or not act as "gatekeepers" for the student body. In an attempt to change this, a section of Physical Geology was redesigned in Fall 2012 and tweaked in subsequent semesters using active learning methods. Lecturing in class was reduced and many of the lectures done in class were interactive requiring students to participate. A variety of techniques have been tried including permanent and temporary groups, immediate feedback assessment tests and the use of clickers. Clicker and redesign of quizzes seemed to make the most impact on overall grades. One area of interest was looking at higher order thinking. Exams and quizzes are multiple choice and the analysis/interpretation/application questions have always proven to be a challenge. Responses for those questions in the redesigned class were compared with previous years to ascertain the impact of the changed learning environment. Preliminary results show a slight, but non-significant increase for responses on the higher order questions.

- 137 - Safety in U.S. secondary science classrooms Sandra S, West, Texas State University

Accidents regularly occur in science classrooms around the world. However, no comprehensive report is available, even for American schools. The most common injuries are cuts and burns, but the most common serious accident is the flame test for elements or the Rainbow laboratory activity that is conducted either as an demonstration by the teacher or as a laboratory activity conducted by students. Requirements that impact safety in U.S. secondary science classrooms and resulting accidents include curriculum, facilities, and injury reporting requirements. This session presents an overview of available data and compares it to data from a longitudinal study (1990-2007) of science classrooms in Texas.

031. Freshwater Sciences II

Freshwater Science

Paper Session

8:30 to 9:45 am

Kirkham Hall: Floor 2 - 206

Participants:

- 138 - How Do You Like Your Eggs (and Hatchlings)? Red-eared slider turtle (*Trachemys scripta elegans*) predation of developing apple snails (*Pomacea maculata*) Amy Elizabeth Miller, Southwestern University; Alexandria Hill, Southwestern University; Allyson Plantz, Southwestern University; Romi Burks, Southwestern University
- Predation acts a strong driving force for community structure, especially in aquatic systems. Global transportation and anthropogenic influences impact aquatic systems by introducing exotic species. Such introductions bolster the importance of

understanding predation potential of native species. Likely facilitated by the aquarium trade, one species of apple snail, *Pomacea maculata* (formerly *P. insularum*), continues to establish invasive populations along the Gulf Coast. Increasing introduction of *P. maculata* in the southeastern states, including Texas, makes mitigating population growth and spread of this invasive species imperative. One common strategy for reducing invasive populations involves utilizing native species that may serve as predators. *Trachemys scripta elegans* (red-eared slider turtles), for example, inhabit riparian zones and consume *P. maculata* eggs, even though these eggs contain a defensive compound. However, no information exists regarding the extent of hatchling predation by turtles. For this project, we tested how color, taste, size of prey, size of predator, and availability of eggs versus hatchlings (n= 10) influenced consumption by turtles with a series of non-choice consumption experiments. With an overall average consumption of about 40%, the turtles did not distinguish between resources given a variety of treatments. We speculate that the defensive compounds in eggs, and perhaps hatchlings, reduce predation but fail to eliminate it. Therefore, it remains unlikely that these native turtles could prevent or control populations of *P. maculata* in Texas. To better combat this species, we recommend that the public continue to look for ways to remove eggs physically at the first sign of invasion.

139 - Seasonal Variation in Reproduction of the Largespring Gambusia, *Gambusia geiseri*, in Two Spring Systems in Texas. *Tamara Fraker, St. Edward's University*

The largespring Gambusia, *Gambusia geiseri*, was introduced throughout Texas in the 1930's for mosquito control and, as a result, became established in several headwater springs. This species is now thought to be invasive in several springs in west Texas, and is thought to be native to the San Marcos and Comal Rivers. Previous data by Sanchez et al. (unpublished) show that this species varies in reproductive investment across habitats, providing impetus for more research on reproductive investment and potential of this potentially invasive species. To our knowledge, no monthly seasonal assessment of reproductive potential has been conducted on this species in its native range. Thus, the objective here was to compare year-round reproductive investment of the largespring Gambusia in both the San Marcos and Comal River populations. Each month since July 2012, males and females were collected from the San Marcos and Comal Rivers. Preliminary data of *G. geiseri* females collected each month from the endemic San Marcos and Comal habitats suggest that the Gonosomatic index (GSI) of these females showed significant variance between the two populations ($p < 0.05$). This data also suggested that the standard length of these females does not significantly vary between these two populations ($p < 0.05$). Fish are being dissected, embryos counted and staged, testes mass determined, and gonosomatic index calculated for both males and females. Data are currently being processed to 1) assess seasonal variation in reproductive investment for both sexes in both populations, and 2) determine peak reproductive seasons for *G. geiseri* in both habitats.

140 - Flow-dependent competitive interactions between the invasive *Gambusia geiseri* and endangered *Gambusia nobilis* in a reconstructed desert wetland habitat *Kelbi Delaune, Sam Houston State University; Chad Hargrave, Sam Houston State University*

The desert-spring fish, *Gambusia nobilis* was once distributed widely throughout the Pecos River drainage from Texas into southern New Mexico. However, water withdrawal and habitat alterations within this system have reduced the distribution of *G. nobilis* to ~6 regions throughout the drainage. Specifically, The San Solomon Spring complex near Balmorhea, Texas currently supports the largest natural *G. nobilis* population globally. However, populations in this area continue to face threats of extirpation because of habitat loss associated with agricultural irrigation in the area. Moreover, *G. nobilis* populations may be further stressed by the presence of an invasive congener (*G. geiseri*) that may compete with *G. nobilis* for resources. This is

supported by recent population estimates showing that the invasive *G. geiseri* out numbers *G. nobilis* by as much as 20 to 1. Additionally, an analysis of gut content data and stable isotope data show high-diet overlap between *G. nobilis* and *G. geiseri*, suggesting that competitive dominance of *G. geiseri* may be a principal cause driving down *G. nobilis* population size in these localities. In order to test these predictions, a competition study with varying density treatments was conducted in the summer of 2012 but showed equal competitive interactions between the two congeners. However, we predict, based on field observations, flow may play an integral part in competitive interactions in this system. Herein, I will report on the results of a second competition study where flow was the key variable tested to determine competitive interactions. These data will be useful for modeling community dynamics necessary to adequately manage populations of the endangered *G. nobilis* throughout its range.

032. Marine Sciences II

Marine Science

Paper Session

8:30 to 9:45 am

Kirkham Hall: Floor 2 - 207

Participants:

141 - A Comparative Cytology of Respiratory Samples of Atlantic Bottlenose Dolphins, (*Tursiops truncatus*) *Desiree Harman, McLennan Community College*

Respiratory illnesses are a common cause of illness and death in both captive and free-ranging Atlantic Bottlenose dolphins, *Tursiops truncatus*. Cytological analysis of respiratory samples is important for the care and treatment of both wild stranded and captive dolphin populations. This study was conducted to learn respiratory cytological analysis skills and to determine a healthy respiratory cytological baseline for use by veterinary technicians and marine mammalogists. Three respiratory samples were collected from eight dolphins at the Roatan Institute for Marine Science (RIMS), Roatan, Honduras in May 2013. Slides were stained using a Dipp Quick protocol and observed for the presence of epithelial cells, bacteria, branching mycelia, and pseudohyphae. The results for two dolphins were significantly higher than other samples for both epithelial cells and bacilli bacteria. These data may have indicated the onset of respiratory illness or inflammation though none of the sampled dolphins showed obvious signs of disease during the sampling process. Samples from non-outlier dolphins indicated a mean range of epithelial cells from 2841-8756/sample and a mean range for bacilli bacteria 369-2330/sample. Differences in the values from these samples could be due to differences in the force behind each trained dolphin "cough."

142 - Coastwide seagrass monitoring for Texas *Cindy Hobson, Texas Parks and Wildlife Department; Adam Whisenant, Texas Parks and Wildlife Department; Jennifer Bronson Warren, Texas Parks and Wildlife Department; Patricia Radloff, Texas Parks and Wildlife Department*

Seagrass beds serve as important habitat for fisheries and wildlife in Texas bays, sustaining recreational and commercial Gulf fisheries. Worldwide seagrass decline is often linked with water quality decline. As resource managers have become more aware of the ecosystem services provided by seagrasses (providing food, cycling nutrients, stabilizing sediments, etc.), the need to evaluate and monitor the condition of seagrass beds over time has come to the forefront. In 2012, TPWD launched a pilot seagrass monitoring program designed to enable the state to monitor changes in seagrass condition over large areas and to infer causal relationships that may explain those changes. Seagrass percent coverage and canopy height were measured at 53 probabilistically-selected sites and 14 fixed sites from Galveston Bay to Lower Laguna Madre, and at 50 probabilistically-selected sites in both Redfish and San Antonio bays. Intensive transect-based monitoring was conducted at five transects in Redfish Bay and three in San Antonio Bay. Permanent monitoring sites have been established and

recommendations put forward for proceeding with a coastwide monitoring program. Recommendations address sampling time frame, staff training, quality assurance and quality control, and cost estimation based on sampling scale. Comparable results for seagrass coverage and canopy height were achieved with multiple crews after orientation and training. Staff achieved comparable results whether seagrass coverage was measured visually or by touch. Implementation of this monitoring program could detect change in seagrass percent coverage within a few years, depending on available resources and sampling intensity.

- 143 - Reassessment of seagrass distribution and biomass in the Lower Laguna Madre, Texas *Joseph Kowalski, The University of Texas - Pan American; Hudson DeYoe, University of Texas Pan American*

The Lower Laguna Madre (LLM) on the south Texas coast contains a significant portion of the seagrasses in Texas. It is critical that the state of Texas know the condition of this valuable resource. Up to 2011, only four seagrass biomass surveys had been completed for the LLM with the last being in 1998. There was special interest in obtaining seagrass distribution data for the LLM after 2010 because of seagrass loss due to Hurricane Alex caused by an unprecedented period of low bay salinities. The goal of this project was to perform a seagrass survey of the LLM in 2012 patterned after the effort of the 1998 Onuf survey. Our survey included data collection on a variety of seagrass parameters including percent cover, biomass (above and below sediment) and canopy height at 167 sites throughout the LLM, as well as data collection on drift algae, water physicochemical parameters and sediment grain size. Seagrasses covered nearly 59% of the seafloor with *Halodule wrightii* the dominant seagrass in the LLM. The distributions of *Thalassia testudinum* and *Syringodium filiforme* were restricted to the southern third of the LLM. Prior to 2010, these species were more broadly distributed in the LLM. Although widely distributed, *H. wrightii* biomass was six times lower than that of *T. testudinum* and more than two times lower than *S. filiforme*. *Ruppia maritima* was a minor component of the seagrass community and *Halophila engelmannii* was not encountered. Between the 1998 survey of Onuf and the 2012 survey, there was an 8% loss of seagrass percent cover in the LLM. Seagrass percent cover in 1998 was 67% while in 2012 it was 59%. Causes for this loss may include the 2010 freshet and stress from long-term nutrient loading.

- 144 - Sargassum Early Advisory System (SEAS): Developing the Best Method of Investigating the Hourly Growth Rate of Sargassum While Suspended in the Neritic Coastal Waters Off of Galveston, Texas *Brandon Hill, Texas A&M University at Galveston; Jeff Frazier, Texas A&M University at Galveston; Robert Webster, Texas A&M University at Galveston; Thomas Linton, Texas A&M University at Galveston*

Sargassum, a pelagic brown alga, is a vital part of marine and coastal ecosystems. It serves as shelter for fish, turtles, and other hatchlings and juveniles. Sargassum acts as a source of food, as it floats closer to the shorelines, birds will feed on the abundant life that grows throughout its mats. It serves a fundamental role once on the beaches; providing organic material to sustain dune vegetation. Sargassum, while vital to beach health, can become a significant burden to coastal communities if too much washes onto a beach at one time. As Sargassum makes landfall it experiences an extreme spike in biomass increase, and overwhelms the system as it is suspended just off the surf zone. Sargassum grows in a vegetative manner, absorbing nutrients located within the surface waters through the outer membrane. The nutrient rich coastal Gulf of Mexico waters provide access to growth-spurring nutrients that serve to accelerate the Sargassum's growth. This research is addressing a means of attaining an accurate measurement of the growth rate within the depth of closure of Texas coastal beaches. This area is targeted due to the increased mixing of nutrients as predicted by the Hallermeier-equation (Hallermeier 1981). The Sargassum Early

Advisory System (SEAS) has the ability to forecast Sargassum events through the observation of the Sargassum within its loop system (Webster and Linton 2013). In order to increase volumetric accuracy of the forecasts the attainment of an expected rate of growth was pursued.

- 145 - Examination of Potential Factors Influencing the Commercial Fisheries of Galveston Bay *George Joseph Guillen, University of Houston Clear Lake*

A review and description of the current status and recent trends in major commercial fisheries that operate in the Galveston Bay system is provided. Factors that may influence these fisheries were also examined using graphical, univariate and multivariate statistical methods. These factors included freshwater inflow, salinity, storms, red tides, regulatory changes, fish consumption advisories, water quality, and economic indicators. To accomplish this published and electronically available state, regional and federal resources were used to compile this information. The analysis was limited to only fisheries that potentially occur within Galveston Bay. Commercial saltwater fisheries that occur in Galveston Bay primarily target Eastern oyster (*Crassostrea virginica*), white shrimp (*Litopenaeus setiferus*), brown shrimp (*Farfantepenaeus aztecus*), blue crab, (*Callinectes sapidus*), stone crab (*Menippe adina*) and various species of non-game finfish. The potential role and influence of each of the previously mentioned factors on fluctuations of each of these fisheries is discussed. For some fisheries economic factors appear to be the primary factor influencing the fishery, whereas other fisheries appear to respond more to fluctuations in physico-chemical changes within the estuary caused by meteorological and hydrological events.

033. Botany Session

Botany

Paper Session

8:30 to 9:45 am

Classroom Lab Building: Floor 2 - 216

Participants:

- 146 - Effects of annual precipitation on a long-term study to document Guadalupe County flora. *Sally Amaye, Texas Lutheran University*

The Weston Ranch Project at Texas Lutheran University has contributed first-time documentations of numerous plant species to the existing records of Guadalupe County plants. The project, which started in the summer of 2007, involves the collection and documentation of plant specimens from the Weston Ranch and, more broadly, from the county. The Texas Lutheran University Herbarium has grown tremendously due to this project. A large number of the collected specimens have also been donated to the holdings of the University of Texas Herbarium and other herbaria. As a result, we were able to use the University of Texas Herbarium database to count the number of newly documented species added each year by the project to existing records of Guadalupe County plants. Then, we tested the hypothesis that variation in annual precipitation affected the rate of documenting new county records. The results of our experiment can contribute to future studies on the impact of climate change on plant species distribution and abundance.

- 147 - Preliminary identification of bacteria colonizing the roots of *Acacia smallii* *Codi Diane Hammons, University of Mary Hardin-Baylor; Kathleen Wood, University of Mary Hardin-Baylor*

The rhizobia are a group of bacteria that have the ability to form symbiotic relationships with legumes, including *Acacia smallii* (a.k.a. huisache). The roots of *A. smallii* are colonized by rhizobia which form nodules and use atmospheric nitrogen gas as a nitrogen source. The purpose of this study was to isolate and identify the bacteria in nodules from the roots of an isolated population of huisache growing in Belton, Texas. Nodules were extensively washed, crushed, put into suspension, and streaked on solid media. The bacteria grown from these nodules were

characterized by colony morphology, gram stain, acetylene reduction, RFLP analysis, and DNA sequencing. Isolates were then inoculated onto *Acacia smallii* seedlings to demonstrate their ability to nodulate. Preliminary results suggest that the bacteria colonizing the roots of the huisache population in Belton are a species of nitrogen-fixing rhizobium.

- 148 - Isolation, characterization, and quantification of flavonoids from pines (*Pinus cembroides*, *P. edulis*, *P. remota*) and their relation to medicinal use *Lauren Hollis, Sul Ross State University; Martin Terry, Sul Ross State University; Md Kalam, Sul Ross State University*
This study was designed to identify and quantify flavonoid composition in the needles of three pinyon, or short-needled, pine species, using high-performance liquid chromatography (HPLC) and mass spectrometry. The first research question to be discussed involves the historical use by the Mescalero Apache of these needles to alleviate symptoms caused by cold viruses, presented in the research as the presence of medicinally beneficial flavonoids such as quercetin, which may ultimately support the pharmacopeial use of pinyon pine needles. The second research question concerns the ongoing debate as to whether or not *Pinus cembroides* and *Pinus remota* are indeed two separate species; the study's findings bring relevant phytochemical data to that discussion.
- 149 - Outlier populations of Quaking Aspen in the Davis Mountains of west Texas: Clone or clones? *Jerritt Nunneley, UTSA*
Populus tremuloides (quaking aspen) is found from the Pacific to the Atlantic Ocean in the northern United States and Canada, and at higher altitudes in the western United States and Mexico. *Populus tremuloides* reproduces sexually or asexually. It is a clonal species and in the intermountain west, mostly reproduces vegetatively via root sprouts, yielding genetically identical stems or ramets. In west Texas, isolated, outlier populations exist in the Guadalupe, Davis, and Chisos Mountains at elevations of approximately 2300 m. This study utilized seven microsatellites or simple sequence repeats (SSRs) from leaves of 10 stems (trees) from 10 isolated *P. tremuloides* populations within the Davis Mountains. We looked to determine if each stem within each population was genetically identical to all other stems in the same population. We then looked to see if each population was genetically the same or different. Each stem sampled within a population was genetically identical or part of a clone. Three of the clonal populations were genetically identical and seven were different. This was demonstrated by examination of polymerase chain reaction (PCR) amplicons followed by capillary electrophoresis sequencing revealing seven distinct genotypes among the ten populations of *P. tremuloides* in the Davis Mountains. However, many of the genotypes shared several of the same alleles and the remaining alleles were only a few base pairs apart. Some of these alleles have been previously identified in other western North American *P. tremuloides* populations. Novel alleles included several triploids which is concurrent with previous studies.
- 150 - Fossil woods of Terlingua Ranch, Brewster County, Texas *David E Lemke, Texas State University; Alaa Ibrahim, Texas State University; Matthew Donahue, Texas State University*
Late Cretaceous and early Tertiary strata (Aguja, Javelina and Black Peaks formations) exposed across Terlingua Ranch in southern Brewster County, Texas, contain an abundance of fossilized wood specimens. Material ranges from large logs 1.6 m in diameter and 15 m in length to much smaller logs and float. Preliminary examination of thin sections prepared from this material indicates the presence of several conifer and angiosperm taxa. A comparison between the fossil wood flora of Terlingua Ranch and that previously documented for Big Bend National Park, as well as implications for the paleoecology of the area, will be discussed.

036. Chemistry and Bio-Chemistry II

Chemistry and Biochemistry

Paper Session

10:00 to 12:00 pm

Classroom Lab Building: Floor 1 - 103

Participants:

- 151 - A synthetic route to Fumagillin utilizing SN2' on an aromatic nucleus *Daniel Hicks, Schreiner University; Danette Rene Vines, Schreiner University*
SN2 substitution on an aromatic nucleus is possible through an SNAr mechanism. This particular mechanism takes advantage of an electron withdrawing group, such as NO₂, on the aromatic ring, allowing substitution to occur by way of a Meisenheimer complex intermediate. This research tries to take advantage of the same intermediate in order to synthesize fumagillin through SN2' substitution. A dithiolane anion was prepared by reacting benzaldehyde with 1,2-ethanedithiol under 10 mol% HCl, then reacting the product with 2 eq. n-butyllithium, and 1 eq copper(I) iodide. The SN2' substitution was attempted by reacting the resulting anion with 4-nitrobenzyl bromide.
- 152 - Amine synthesis via metal-catalyzed reduction of amides by silanes: Isolation and reactivity of intermediates *Jorge Luis Martinez, The University of Texas at El Paso; Hemant Sharma, UTEP; Renzo Arias-Ugarte, UTEP; Keith Pannell, UTEP*
The reduction of amides to form amines has been a vital tool in organic synthesis, in particular with the use of silanes, R₃SiH, catalyzed by metals. This mild reducing method has been a popular choice for the reduction of different amides in the chemical industry. The use of 1,1,3,3-tetramethyldisiloxane (HSiMe₂OSiMe₂H, TMDS) to reduce N,N'-dimethylformamide (DMF) to trimethylamine (NMe₃) has proven to be a cheap and efficient reducing agent as a result of the "dual Si-H effect." [1] However, in spite of the popularity of this reaction, little is known about its mechanism. We recently reported the first observed, and successfully isolated, hydrosilylated intermediate (Me₂NCH₂OSiMe₂)₂O in the presence of the (NMe₃)Mo(CO)₅ catalytic system. [2] On the other hand, our use of Karstedt's catalyst, popular for hydrosilylations in the industry, yields a different hydrosilylated intermediate, apart from the known intermediate and products. The unknown intermediate was discovered to be the initial single hydrosilylated species (Me₂NCH₂OSiMe₂OSiMe₂H), requiring only one equivalent of TMDS per mol of DMF. Since this intermediate also forms the reduced amine product, it explains the "dual Si-H" effect for the first time. [1] Nagashima, H., Motoyama, Y., Tsutsumi, E., Hanada, S. J. Amer. Chem. Soc. 2009, 131, 15032-15040. [2] Sharma, H., Arias-Ugarte, R., Tomlinson D., Gappa, R., Metta-Megaña, A., Ito, H., Pannell K. Organometallics 2013, 32, 3788-3794.
- 153 - Development of a versatile documentation system for bioanalytical methods *Jessica Rose Kenneson, Wayland Baptist University*
Costly instruments can limit the variety of laboratory techniques available to small-budget universities. High-end DSLR cameras, however, possess high detection capabilities and are versatile in a laboratory setting. A Canon EOS 5D Mark II camera equipped with a Canon EF 3.5mm f/1.4L USM wide angle lens fixed in a tailored blackbox was utilized for capturing beetle luciferin bioluminescence, fluorescent agarose gels, luminol-based chemiluminescent EMSAs, and white-light transluminescence used for techniques such as Western blots and polyacrylamide gels. Standard curves imaged by the DSLR camera were processed and analyzed using Adobe Photoshop and ImageJ. The optimum setting for imaging each assay technique was determined from that which produced the most linear dilution curve and lowest projected detection limit. When compared with the standard curves produced by the traditional imagers, it was evident that the DSLR produced more linear data and therefore

performed superior to these imagers. This documentation system is easily mastered, yields better data quickly, and is significantly more affordable than purchasing multiple, less adaptable instruments – making it more practical, even for universities that are unable to afford commercial documentation systems.

154 - Forensic analysis of hand lotions using solid phase extraction and ATR-FTIR spectroscopy *Christopher Jackson, St. Edward's University*

This research aims to extract the fatty acid components in hand lotions of small sample sizes and differentiate between various lotions using ATR-FTIR spectroscopy. Previous research has created a protocol for the extraction of fatty acids in large sample sizes, using a separatory funnel technique. Solid phase extraction is generally used in forensic analysis of small sample sizes to separate the organic and water soluble components of lotion. Finally, the fatty acids are analyzed using ATR-FTIR spectroscopy, which provides the composition of the fatty acids in the sample. It was found that solid phase extraction could be used to isolate the fatty acids in various lotion samples. Furthermore, the resultant spectra from the analysis using ATR-FTIR spectroscopy showed distinctions between various lotions based on their isolated fatty acids. The results of this study concluded that 100 mg lotion samples could be successfully analyzed and differentiated with high levels of accuracy using an IR spectral library and software matching techniques. This research is partially supported by a grant from the National Science Foundation (#969153).

155 - Solvent/triclosan molecular interactions that prevent consistent analysis *Elizabeth A Fawcett, Schreiner University; Kiley Miller, Schreiner University*

A widely used antibacterial that acts as a pesticide and an endocrine disruptor is affecting the environment. Triclosan is one of the latest antibacterials that has been synthesized, and as such, has not been well studied. This creates cause for concern for the environment, especially with the analyte likely not being removed during water treatment and being released into environmental systems. It is essential to have the capability to analyze triclosan concentrations in a high throughput fashion. Based on previous research, gas chromatography of isopropyl alcohol extracts was used to develop standard curves for concentration determination. Three studies were conducted. Each study yielded results that led to more questions about the linear behavior of the assay. The first study was performed using known environmental concentrations, and resulted in some confusion. The second study was performed with an expanded concentration range, as was the third study after more defined, but still confusing results. Through solvent/analyte modeling it was determined that there could be interactions with the analyte by the solvent preventing consistent analysis of the analyte. The current standard curve has a repeatable anomaly and this deviation from linear is thought to be created by this solvent/analyte interaction. To overcome this interaction we plan to overwhelm the solvent with analyte through a standard increase in concentration of analyte.

037. Systematics and Evolutionary Biology III

Systematics & Evolutionary Biology

Paper Session

10:00 to 12:00 pm

Ocean & Coastal Studies Building: Floor 1 - 141

Participants:

156 - Chloroplast DNA sequences and morphological features provide new perspectives on hybridization in *Juniperus* (Cupressaceae) *Jordan Britten, Lamar University; Randall G. Terry, Lamar University*

Previous studies have documented introgressive hybridization between three species of *Juniperus* (*J. grandis*, *J. occidentalis*, and *J. osteosperma*) from western Nevada and adjacent California and Oregon. Pollen-mediated gene flow from *J. grandis* and *J. occidentalis* to *J. osteosperma* has been commonly

documented; however, limited sampling of *J. grandis* and *J. occidentalis* has precluded determination of the relative contributions of each in the introgressive process, and a broader perspective of events in the putative hybrid zone is needed. In this study, comparative sequencing of the *trnS-trnG* intergenic spacer and increased population sampling is used to extend results from previous studies addressing introgressive hybridization between *J. grandis*, *J. occidentalis*, and *J. osteosperma*. The identification of new cpDNA haplotypes, assessment of relationships between haplotype and morphological variation, and study of biogeographical patterns in genetic and morphological variation provide new insights into interspecific gene flow and hybridization in the group.

157 - Molecular, karyotypic, and morphometric evidence for a new species of *Peromyscus* (Rodentia: Cricetidae) from Mexico *Robert D Bradley, Texas Tech University; Nicté Ordonez-Garza, Texas Tech University; Cibele Sotero-Caio, Texas Tech University; Howard M. Huynh, Texas Tech University; C. William Kilpatrick, University of Vermont; Ignacio Iñiguez-Dávalos, Universidad de Guadalajara; David J. Schmidly, University of New Mexico*

The systematics of rodents of the *Peromyscus boylii* species group is complex. Several studies elucidated relationships among members of such species group, including the discovery of cryptic species. Environmental factors, including geomorphology and discontinuity of habitats have allowed speciation of the *P. boylii* species group in Mexico. Previous studies indicated that specimens of rodents from eastern Nayarit, Mexico, possessed a karyotype and mitochondrial DNA haplotype distinct from other members of the *P. boylii* species group. Additional specimens from this region provided an opportunity to re-evaluate the taxonomic status of this complex. Morphological comparisons among members of the *P. boylii* species group revealed that specimens from eastern Nayarit have a significantly longer length of the nasal bone. Further, phylogenetic analyses of likelihood and parsimony of mitochondrial DNA sequences of Cytochrome-b gene indicate that these specimens form a monophyletic clade embedded within a strongly supported clade containing representatives of *P. beatae*, *P. levipes*, and *P. schmidlyi*. Together, these results suggested that a new species is warranted. Further results, suggested the existence of additional undescribed taxa remaining in western Mexico, especially regarding populations of *P. boylii*-like forms from the states of Jalisco, Michoacán, and Nayarit.

158 - Phylogenetic signal measured by K has a complex relationship with taxon sampling *William Gelnaw, University of Texas at Austin*

Phylogenetic signal, the degree to which similarities between taxa are shared due to common descent rather than convergence, is important for evaluating the relationship between ecological pressures and developmental constraints in evolution. Presently, one of the most popular metrics is Blomberg's K statistic, which compares the distribution of character states on a phylogenetic tree to the range of distributions that would be expected under a Brownian motion model of character evolution. However, up to now, nobody has examined the effect of taxonomic sampling on expected results when calculating K. The phylogenetic signal contained in linear morphometrics of limb and skull morphology was evaluated for a set of over 1700 lizards representing a broad taxonomic and ecological cross-section of Scincidae and three outgroup families. To examine the effect of sample size, the taxa were randomly resampled at 15 different sampling levels. I found that increasing sample size can actually decrease the signal measured. Furthermore, I found that the rate of decrease in signal with respect to sample size was related to the amount of

signal measured at the maximum sample size and how the data was treated prior to measuring signal. I conclude that researchers using K to make statements about evolutionary trends or associations need to examine the relationship between K and sample size in their individual system and make it known to the reader at least when comparing their work to work on other evolving systems.

- 159 - Systematics of the Subfamily Neotominae (Rodentia: Cricetidae) based on combined mitochondrial and nuclear DNA sequences *Megan Keith, Texas Tech University; Roy N. Platt II, Mississippi State University; Brain R. Amman, Center for Disease Control; Robert D Bradley, Texas Tech University*

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

038. Terrestrial Ecology and Management IV

Terrestrial Ecology and Management

Paper Session

10:00 to 12:00 pm

Ocean & Coastal Studies Building: Floor 1 - 142

Participants:

- 160 - Cascading effects of animal disturbances to the moss layer on soil characteristics in northeastern Siberia *Aaron Phillip White, The University of Texas at Brownsville; Heather Alexander, University of Texas at Brownsville; Kenneth Pruitt, The University of Texas at Brownsville*
Boreal forests within arctic ecosystems occur at high latitudes where cold and moist conditions favor ground layer dominance by mosses. This functional type is critically important because mosses insulate and protect underlying permafrost from warming and support nitrogen fixing microorganisms needed for the growth of vascular plants. Mosses also provide food and/or shelter for arctic animals, especially during harsh winter months. Animal disturbances to the moss layer can have indirect effects on soil properties that feedback to influence both stability of underlying permafrost and establishment and growth of other vegetation types. During summer 2013, effects of animal disturbances to the moss layer on soil characteristics were evaluated within a boreal treeline ecosystem in far northeastern Siberia. Thaw depth (i.e., depth to the permafrost layer), soil

temperature, and soil moisture were measured at the center of disturbed moss patches and within two locations of adjacent undisturbed mosses (0.2 m and 1 m from the edge of the disturbed moss patch). Soils at disturbed patches had deeper thaw depths (patch: 0.68 ± 0.06 m vs. 1 m: 0.44 ± 0.09 m), warmer temperatures (patch: $6.69 \pm 0.69^\circ\text{C}$ vs 1 m: $2.9 \pm 0.79^\circ\text{C}$) and higher moisture (patch: 0.41 ± 0.05 m³/m³ vs 1 m: 0.07 ± 0.08 m³/m³) than soils under undisturbed areas of the moss mat. These results suggest that animal disturbances have the potential to alter soil volume available for plant uptake of nutrients and water. As climate continues to change, understanding how animal disturbances influence soil characteristics is important for predicting future changes in plant community composition.

- 161 - Determining the drivers of plant community structure of Wild Basin Wilderness Preserve and BCP Vireo Preserve *David R Johnson, St. Edward's University; Mike Sacher, St. Edward's University; Lauren Kelley, St Edward's University; John Brickley, St. Edward's University*

Resampling fixed plots within plant communities represents one of the strongest methods of ecosystem structure and function change detection. Towards this end, we established fixed (GPS locations) plots within Wild Basin Wilderness Preserve and adjacent Balcones Canyonlands Preserve Vireo Preserve (WB/VP), located within Austin Texas. These serve as a baseline for understanding plant community dynamics, allowing for informed management decisions. We collected plant community data using a combined line-intercept/point-frame method to quantitatively describe plant communities within WB/VP between late-May and mid-July 2013. Concurrently we collected environmental data (soil structure and composition, soil moisture, slope, aspect, fractional canopy, etc.) to estimate the predominant ecological drivers of vegetation structure. Plant community data were analyzed using hierarchical cluster analysis and non-metric multidimensional scaling (NMS), and environmental variables were used as predictors of NMS axis scores using recursive partitioning. We found five distinct plant communities within the WB/VP. These communities ordered together along two axes in an NMS ordination and roughly coincide with prior reports of plant community structure at WB/VP. Fractional canopy was the primary predictor of axis one, while soil structure was the prominent predictor of axis two. Interestingly, soil moisture alone did not predict community location within theoretical ordination space. These results suggest that biotic variables may be as important as abiotic ones in driving vegetation structure at WB/VP. Future work will involve resampling to decipher interannual and long-term dynamics of the vegetation in this system, determining how these preserves fit within the dynamics of the larger Austin socio-ecological system.

- 162 - Survival and Growth of Thornscrub Seedlings in Response to Multiple Restoration Strategies *Krysten Dick, The University of Texas at Brownsville; Heather Alexander, University of Texas at Brownsville; Jonathan D Moczygemba, US Fish and Wildlife Service, Laguna Atascosa NWR*

Tamaulipan thornscrub ecosystems consist of diverse, short-statured, drought-resistant shrubs found throughout semi-arid, sub-tropical regions of northeastern Mexico and southern Texas. As a result of urbanization, agriculture, and invasion by exotic grasses, this ecosystem currently occupies <1% (200,000 km²) of its original range. To restore thornscrub ecosystems, the U.S. Fish and Wildlife Service (USFWS) at Laguna Atascosa National Wildlife Refuge in southern Texas has planted thousands of Tamaulipan thornscrub seedlings of ~40 species. In January 2013, ~1,200 of these seedlings were treated with three restoration treatments (herbivore exclosure fencing, seedling protective tubes, and grass-specific herbicide) used singly and in combination. These treatments were selected to help seedlings overcome herbivory, growth in a water-limiting environment, and competition with invasive grasses. Following treatment, basal diameter, seedling height, browse intensity, and invasive grass cover were measured on each seedling every 4-mo over a

1-yr period. By September 2013, seedlings in tubes grew 1.32-4.64x faster and were 16.7-26.9% taller than seedlings without tubes, regardless of fence or herbicide treatments. While herbivore exclosures and herbicide treatments also increased seedling height and growth, the effects were substantially less pronounced than for seedling tubes. Our findings suggest that an effective strategy for improving thornscrub restoration is to place seedlings in tubes, thereby excluding herbivores when seedlings are small and creating a more favorable microclimate.

163 - Flowers visitors on native restoration plants in South Texas *Richard James Wilson Patrock, Kelburg-Kenedy Soil and Water Conservation District; John Reilley, PMC Manager E. "Kika" de la Garza PMC 3409 North FM 1355 Kingsville, Texas 78363*

Replanting of native forbs and grasses is a growing restoration practice in South Texas ranch lands to compensate for natural and artificial declines in production and biotic diversity. A significant issue in this area is seed availability since native seed from other areas of Texas do not fare well in the harsh and varied environment of South Texas. We present details of a descriptive aspective on eco-type production of some South Texas local natives that is directly concerned with seed production: flower visitation and pollination. We followed insect and flower visitors to seven target species in agro-ecosystem and natural ranch land situations for a period of seven months in 2013-2014 using largely non-destructive visual and photographic methods complemented by collections. We found over 60 species of butterflies, and a wide assortment of bees, wasps, flies and other groups with numerous species range extensions and county records, as well as at least new bee species. Abundance patterns in relation to flowering patterns of hosts will be discussed.

039. Mathematics I

Mathematics

Paper Session

10:00 to 12:00 pm

Powell Marine Engineering Complex: Floor 1 - 144

Participants:

164 - Results in Finite Geometry Pertaining to Albert-Like Semifields *Angela Michelle Brown, Sul Ross State University*

One highly studied class of semifields are the generalized twisted fields defined by Albert in the 1950s and 1960s. The collineation groups of the planes created from the generalized twisted fields have been completely described. Extending on results put forward by Cordero and Figueroa, we show that for a pre-semifield with the product $x \circ y = a_u x^{(u)} y^{(e)} + a_v x^{(v)} y^{(e)}$, behaving much like Albert's generalized twisted fields, will in fact give some new semifields. To show this, we studied the collineations of the semifield planes they coordinatized to aid in classifying the semifields.

165 - Knot Selection in Least Squares Approximation with Free Knot Splines *Brian Adamson, Wayland Baptist University*

The interpolation of data can provide valuable insights into underlying patterns in the data, however common methods of interpolation often result in poor curves when sufficiently large or noisy data sets are used; in these cases the interpolating polynomial becomes overly complicated with unrealistic oscillations. The use of least squares approximation with piecewise polynomials and splines can alleviate some of the complexity, however the selection of the knots or breakpoints is critical to the quality of the approximating curve. Free knot splines were implemented in order to capture the underlying patterns while seeking to acquire small least square residuals. Several algorithms were developed which utilized various non-linear optimization methods in order to determine the optimal knot sequence. Monte Carlo experiments indicate that an iterative approach that optimizes the knots for a given set of coefficients then recalculates the coefficients via least squares was more accurate than the other methods considered.

166 - Characteristics of in-magic digraphs and further research on magic digraphs *Bianca Jayne Perez, Southwestern University*

This paper will examine the properties of in-magic digraphs and add further to the knowledge of magic digraphs. An in-magic digraph is a digraph in which the vertices and edges are labeled with unique positive integers in such a way that the sum of the edge labels going in to a vertex plus the vertex label is the same at every vertex. Properties of in-magic digraphs, the labeling of in-magic digraphs, and the number of graphs that can be produced for certain classes of single-edge digraphs are discussed. Trees, paths, stars, cycles and complete bipartite graphs are some of the classes that are examined.

167 - Does oversampling compensate for loss to follow up in survival analysis? *John A Ward, Brooke Army Medical Center*

Survival and proportional hazards analysis is used in medical research to estimate the median survival time and hazard ratio and to test the hypothesis that there is no statistically significant difference between two treatment or risk groups. In preparing a study design analysis, the statistician must recommend a sample size (n) based on the expected morbidity or mortality rates and loss to follow up (censorship). We used a Monte Carlo simulation of linear decay to estimate the effect of 0, 13.75, 27.5, 41.25, and 55% censorship on estimation of the median survival and hazard ratio. For a known median survival of 26 and 54 months in two risk groups with first order decay, we fit a general polynomial to a 25 point surface that spanned the range of interest from n = 0 to 1100. The RMS errors were 14.154, 6.904, and 0.038 for the two median survival times and the hazard ratio, respectively. The most robust statistic was the log rank test, which consistently detected a difference between the risk groups at the p < 0.001 level. As censorship and oversampling increased, the hazard ratio increased from 0.381 to 0.558, approaching the expected ratio of 0.565. Conversely, median survival estimates diverged from the expected values. We concluded that oversampling has no effect on the log rank test, compensates for loss to follow up for the hazard ratio estimate, and worsens the median survival time estimates. (The views expressed here are the author's and not those of the U.S. Government.)

168 - Error in non linear regression due to transformation *John T. Sieben, Texas Lutheran University*

In this paper I will examine the error induced by using data transformations when applying least squares methods to non linear data.

040. Conservation Ecology III

Conservation Ecology

Paper Session

10:00 to 12:00 pm

Powell Marine Engineering Complex: Floor 1 - 145

Participants:

169 - Impact of Soil-based Habitat Restoration Treatments at the Black Capped Vireo Research Area and Wild Basin Wilderness Preserve on Fungal Microbiomes *Cody Ramirez, St. Edward's University; Samantha Parsons, St. Edward's University; Lisa O'Donnell, City of Austin, Balcones Canyonlands Preserve; Charles Hauser, St. Edward's University*

The Edwards Plateau, consisting a region of uplifted limestone, provides an island of Glen Rose soils that fostered the speciation of many organisms and forms one of North America's areas of endemism. With an extreme and unpredictably variable climate, the survival of regional flora is increasing recognized to be dependent on tight relationships with soil microbiota, which have not been described. The Black Capped Vireo Research Area and Wild Basin Wilderness Preserve are part of the Balcones Canyonlands Preserve, protecting eight endangered species, as

well as 27 species of concern. As part of an adaptive management experiment designed to improve habitat restoration techniques for black-capped vireos, soil fungal populations from established vireo habitat control sites, and vireo habitat restoration sites were profiled using 454 rDNA sequencing. The 5 soil treatments sites included: 1) control treatment; 2) onsite mulch containing local juniper and hardwoods; 3) onsite composted mulch containing local juniper and hardwoods; 4) Mulch and biochar combined; 5) composted mulch and biochar combined. The hypotheses were that fungal diversity would be specific for each treatment, and that each treatment would result in a signature set of operational taxonomic units (OTUs). Our preliminary analyses have identified 1387 operational units (OTUs) present in the treatment samples. Principal component analyses (PCoA) using both weighted (based on abundance) and unweighted (sensitive to rare taxa) Unifrac distance metrics revealed that 36.9% (weighted) of the variance is attributed to sample time (PC1), whereas 22.2% (weighted) of the variance is distinguishes soil restoration treatment (PC2).

170 - Movement and genetic patterns of Texas horned lizards (*Phrynosoma cornutum*) in an urban environment *Ashley Wall, Texas Christian University; Dean Williams, Texas Christian University; Daniella Biffi, Texas Christian University*

Urbanization often results in habitat degradation and changes in community structure. Within the urban environment, physical barriers to movement (including roads, fencerows, or unsuitable habitat) limit gene flow between groups of individuals, thereby reducing genetic variability in populations. Low genetic diversity often produces inbreeding depression and limits adaptability of populations to environmental change. We used radio-telemetry and genetic analyses to determine if Texas horned lizards (*Phrynosoma cornutum*) living in small towns in Karnes county, Texas have restricted movement relative to populations living in more natural areas. We fit 14 Texas horned lizards in the towns of Kenedy and Karnes with radio-transmitters and relocated individuals daily from June through August 2013 and calculated home ranges. We obtained DNA samples from 126 individuals and genotyped them at the mitochondrial control region and 14 nuclear microsatellite loci. These genetic data were used to test for genetic bottlenecks and to estimate patterns of spatial genetic diversity to detect limited movement within towns. Insight into the movement patterns of urban populations can allow for the creation of management and restoration strategies to preserve Texas horned lizards and other urban herpetofauna for future generations.

041. Freshwater Sciences III

Freshwater Science

Paper Session

10:00 to 12:00 pm

Kirkham Hall: Floor 2 - 206

Participants:

171 - Macroinvertebrate community composition of a re-flooded resaca as a potential indicator of successional stage *Leah McIntosh, University of Texas at Brownsville; Alejandro Fierro-Cabo, University of Texas-Brownsville*
 Freshwater wetlands in the Lower Rio Grande Valley of Texas are locally known as resacas. Resacas are remnants of the Rio Grande River channel that were naturally cut off by sedimentation and erosion of river banks. Many are maintained as permanent wetlands through intermittent water pumping from the river. These resacas provide valuable habitat for fish, invertebrates, migratory birds and a diverse floral community in the otherwise semi-arid environment of South Texas. Despite the importance of the resaca ecosystems, very little is known about how the ecosystem functions. The objective of this study is to use the macroinvertebrate community to differentiate successional stages of resacas and determine if the macroinvertebrate community can be used to assess ecosystem status. The macroinvertebrate community was sampled from, and compared

between, a recently re-flooded resaca and two similar resacas in different stages of succession after re-flooding. Preliminary results indicate that the most established resaca has the greatest abundance of invertebrates, but the lowest diversity. The recently re-flooded resaca has the lowest abundance but the greatest diversity among the three. Gastropods comprise the dominant class of the benthic community, representing more than 90% of the individuals collected in the two developed resacas. Community composition and density is influenced by the presence of an invasive gastropod. From these preliminary results it is expected that the metrics derived from the macroinvertebrate community will discriminate among sites, therefore the macroinvertebrate community's value as an ecological indicator for these aquatic ecosystems will be assessed.

172 - Texas lotic fish communities: preliminary analysis of spatial patterns *Michael Lane, University of Houston Clear Lake; Stephen Curtis, Environmental Institute of Houston; Jenny Oakley, Environmental Institute of Houston; George Guillen, Environmental Institute of Houston*

Texas freshwater stream fishes have been subjected to the modification of their habitats at multiple levels. Various stressors include stream channelization, increased impervious surfaces within the watershed, and fragmentation by dams. These have all contributed to significant changes in stream fish community composition. Recently, the Environmental Protection Agency (EPA) through the National Rivers and Streams Assessment (NRSA) program has attempted to accurately survey and assess the condition of our nation's streams and rivers. The approach utilizes probability based sampling of random reaches of rivers and streams throughout the United States, focusing a major portion of their assessment on fish assemblages. For our study, 31 sites across Texas were randomly selected and were surveyed through electrofishing in the summer of 2013. Major river basins visited include the Sabine, Trinity, Brazos, Colorado, and Nueces. In addition to fish community data, physicochemical data was collected and analyzed in an effort to observe large scale patterns in flow regime, water quality, physical habitat, and resulting fish communities through a probabilistic sampling frame. Spatial trends in the abundance, richness, diversity, and community composition as well as potential causative factors based on this preliminary analysis of year one results are presented. Additional sample collection will be conducted throughout the summer of 2014. Data gathered from both years supplemented with historical data will be used to generate a more complete assessment of the status of Texas freshwater streams based on physicochemical and fish community data.

173 - Effects of experimental warming on stream ecosystem structure and function *Chad Hargrave, Sam Houston State University; Kaitlen Gary, Sam Houston State University; Jaquiline Lee, Sam Houston State University*

We conducted a 90-day field mesocosm experiment to test the potential effects of global warming on stream ecosystem structure and function. We implemented an elevated temperature treatment (eT) of +4C using infrared quartz heaters and measure the response in watercolumn nutrients, periphyton, leaf litter decomposition, benthic invertebrates, and fish growth to increased water temperature. Effects of experimental warming on stream ecosystem properties were mixed. We found no effect of increased water temperature on watercolumn nutrients or benthic periphyton. However, elevated temperature increased leaf litter decomposition and reduced benthic invertebrate density. Finally, increased water temperature increased fish growth. Our data suggested that global warming could have significant effects on stream ecosystems by altering interaction strength of important food web processes that regulate stream structure and function.

042. Marine Sciences III

Marine Science

Paper Session

10:00 to 12:00 pm

Kirkham Hall: Floor 2 - 207

Participants:

- 174 - Consumer demand and the 19th century decline of Chesapeake Bay marine resources: the case of diamondback terrapin and canvasback duck *Raven Delaney Walker, Texas A&M University at Galveston; Josh Carter, Texas A&M University at Galveston*

The depletion of marine fisheries is not unique to the latter half of the 20th century. Once the most productive and economically important estuary in the US, Chesapeake Bay has seen its resources depleted severely over the past 150 years. In the 1800s Chesapeake Bay supplied large numbers of two highly sought delicacies: diamondback terrapin and canvasback duck. During the 19th century diamondback terrapin transitioned from food exclusively served to slaves to being an 'aristocrat of the marshes.' Diamondback terrapin and canvasback duck had been hunted to commercial extinction by the 20th century. These two species were served as complementary meals: Terrapin a la Maryland, a Madeira wine-laced soup, and canvasback duck as the entrée. These species were no longer served in restaurants due to passage of the Migratory Bird (1918) and Volstead Acts (1919). Utilizing previously unexamined data, including newspapers, price current lists, and menus we find that as each species popularity rose so did its inflation-adjusted price. From 1860 to 1905 the restaurant price of canvasback duck increased from \$30(2012\$) to \$120(2012\$), an annualized increase of 3.2% above inflation rate. Terrapin a la Maryland rose from \$20(2012\$) to \$75(2012\$); an annualized increase of 3.0% above inflation rate. These real dollar increases are some of the largest seen for any marine resource and it was consumer demand that drove those increases. We conclude that in the heavily modified ecosystems existing today, an understanding of historical conditions can provide a robust baseline for assessing change.

- 175 - Scope for growth of *Scolecopsis squamata* before and after mercury exposure *Debra Hoekel, Texas A&M University-Corpus Christi*

Most studies of mercury in aquatic food webs have focused on commercially fished pelagic marine species and the entry of methylmercury into food webs and its subsequent trophic transfer is still poorly understood. Most studies have focused on deposit and suspension feeding invertebrates as the primary vector by which mercury enters estuarine food webs and the role they may play in the biomagnification of methylmercury at higher trophic levels. In comparison with freshwater environments, the lethal/sublethal effects of contaminants on marine or estuarine organisms, particularly invertebrates, have been poorly studied. Polychaete worms are a prevalent prey item in Texas recreational fish food webs and are consumed by forage fish such as pinfish (*Lagodon rhomboides*), thus have the potential to be both a source of bioaccumulation of methylmercury to higher trophic levels, as well as a limiting resource if their abundance in the food web is altered. Scope for growth (SFG) is a series of measurements of an energy budget, energy intake and metabolic output, which can be used to determine if the environmental stress of an animal is affecting an organism's growth and reproduction. By using SFG in a laboratory setting, sublethal effects of mercury contamination of *Scolecopsis squamata* will be determined. SFG of *S. squamata* will also be established before and after a mercury exposure period via a water column and a sediment surface inoculated algae source.

043. Geosciences

Geosciences

Paper Session

10:00 to 12:00 pm

Classroom Lab Building: Floor 2 - 216

Participants:

- 176 - A Taxonomic and Geologic Study on an Oreodont Skull Excavated from Buffalo Gap National Grasslands of South Dakota *Garrett Ross Williamson, Wayland Baptist University; Tim Walsh, Wayland Baptist University; David Schmidt, Westminster College*

During the summer of 2012, a Wayland Baptist University geology field team located and excavated numerous Eocene age fossil specimens from the White River Group in the Buffalo Gap National Grasslands, South Dakota. One of the specimens collected from the Scenic Member of the Brule Formation was a skull which was field identified as an Oreodont. The skull was preserved within a sandstone concretion that had eroded from the Scenic into a gully cut in a slump block. The slump, composed of the Scenic Member, sustained approximately 23 meters of displacement and is currently resting within the upper portion of the underlying Chadron Formation. Most of the specimen's cranium was not present, being represented by a sandstone mold, but the actual maxilla, mandible, and part of the right orbital were preserved. After lab preparations it was revealed that at least one of each tooth type is represented, although not all teeth are present. Morphometric comparisons were therefore primarily restricted to tooth morphology and positioning, which gave clear indications of mammalian origins. Since the skull was found on a slump with substantial displacement, mammals from throughout the lower Brule (Orellan age, NALMA) had to be considered as possible candidates during the identification process. The Mammalian families under consideration were Merycoidodontidae, Agriochoeridae, Camelidae, Xiphodontidae, Protoceratidae, and Leptomerycidae. After comparisons of dental morphologies, it was concluded that the fossil skull belonged to the Merycoidodontidae family; a type of Oreodont. Further analysis is underway to better define the taxonomic position of the specimen.

- 177 - Identification of rodent microfauna using postcrania with implications for paleoenvironmental reconstruction *Timothy Lee Campbell, Department of Anthropology, Texas A&M University; Thomas DeWitt, Texas A&M University; Darryl de Ruiter, Texas A&M University*

Paleoenvironmental reconstruction using fossilized microfaunal (<500µm) remains often rely on the assumption that the environmental tolerances of fossil specimens are similar to the extant taxa they resemble. In such analyses, craniodental remains are typically used for taxonomic identification; rodent postcranial remains are generally not considered, and such omissions may limit inferences. In this study we explore using rodent postcrania in taxonomic assessments, using traditional morphometric techniques. Nineteen linear measurements were taken on five postcranial elements: the humerus, radius, ulna, femur, and tibia. A total of 90 rodent specimens were examined from the Natural Science Research Laboratory at Texas Tech University (Lubbock, TX) and at the United States National Museum of Natural History (Washington, D.C.), representing extant taxa from 4 families, 8 subfamilies and 15 genera. Specimen size was calculated as the log geometric mean of the suite of linear distances. Shape data (as scaled proportions) were created by dividing log distances by the size measure. Shape data were distilled by principal components analysis to five axes that collectively represented 95% of total variance. The five shape variables were analyzed using MANOVAs for the categorical variables of family, subfamily, genera within subfamilies, allometry, and interactions. Shape differences were evident and strong for all levels of taxonomic organization. These results suggest that shape analysis of postcranial skeletal remains can be a reasonable means to estimate paleocommunity composition. As postcranial remains are not often found in association in paleontological deposits, we briefly discuss the use of this source of data in paleoenvironmental reconstructions.

- 178 - Development and Evolution of Galveston Island and Bolivar Peninsula, Texas *Russell LaReill Nielson, Stephen F.*

Austin State University; Chris A. Barker, Stephen F. Austin State University

Galveston Island and Bolivar Peninsula developed during a low sea level stand near the end of the Pleistocene, as part of what may have been a wave dominated delta built by the Trinity and San Jacinto rivers. At the end of the Pleistocene, sea level rose rapidly and continues to rise slowly resulting in the San Jacinto and Trinity river deltas becoming drowned and deposition shifting to the north. When this occurred, the delta type changed from a wave dominated delta to become a tidal dominated delta in an estuarine setting. The evidence supporting the wave dominated delta origin is seen in the arc shaped geometry of Galveston Island and Bolivar Peninsula that is similar to other wave dominated deltas along the Gulf Coast. Arc shaped chenier ridges are seen on both Galveston Island and Bolivar Peninsula showing the pattern of sedimentation that produced them. The Pleistocene delta front (i.e., Galveston Island and the Bolivar Peninsula) continues to migrate landward as part of the evolution of the area. Sand was and is provided by the dominant long shore current from the east. This current also shaped Galveston Island and Bolivar Peninsula. With time, the northward migration of Galveston Island and Bolivar Peninsula will weld them to the mainland and sedimentation from the Trinity and San Jacinto rivers will fill Galveston and Trinity bays with sediment. An earlier and similar cycle of landward delta front migration produced the bar complex that extends east from Smith Point, Texas.

045. Poster Session II

1:00 to 2:00 pm

P.E. Facility: Floor 1 – McCloy Arena

045-1. Poster Session II

Texas Academy of Science Annual Meeting
Special Event

045-2. Biomedical Poster Session

Biomedical
Poster Session

Participants:

- 179 - Can probiotic bacteria control *Salmonella enterica* St. Paul in the model organism *Caenorhabditis elegans*? Jana Soares, St. Edward's University; Rachel Murray, St. Edward's University; Patricia J. Baynham, St. Edward's University

Annually, 42,000 cases of salmonellosis, caused by the bacterium, *Salmonella*, are reported in the United States. Previous studies have shown that lactic acid bacteria may inhibit pathogens such as *Salmonella* by competing for colonization, releasing antimicrobial substances, or positively affecting the host. *Caenorhabditis elegans* is a model organism to study *Salmonella* infection and the possible effect of Lactobacilli in controlling this pathogen. In this study, various *Lactobacillus* strains were tested for their ability to inhibit *Salmonella* using a top agar diffusion assay. *L. acidophilus*, found to have the most striking effect, was further analyzed to determine if it could control *Salmonella enterica* St. Paul infection in *C. elegans*. *S. St. Paul* was labeled using a transposon to place *gfp* in the chromosome at the *glmS* site to qualitatively view *Salmonella* infected nematodes using a fluorescence microscope. A survival assay indicated that *C. elegans* fed *L. acidophilus* for two days before *Salmonella* infection were more likely to survive compared to *C. elegans* not fed the probiotic bacterium. After 8 days, 65% of nematodes fed *S. St. Paul* survived compared to 85% of nematodes treated with the probiotic. Qualitative data showed that *S. St. Paul-gfp* colonized the gut of *C. elegans* and quantitative data through bacterial enumeration confirmed this. Results also showed that *L. acidophilus* colonized the gut of *C. elegans*. Challenges due to bacterial contamination complicated these data. Next steps in this research would be to improve experimental techniques, increase the number of trials, and perform statistical analyses on collected data.

- 180 - The Effect of Acute Exercise on the Attentional Blink
Lacey Saunders, Schreiner University; Chien-Ting Wu, Schreiner University

Previous studies have demonstrated that single bouts of exercise have transient benefits to aspects of cognitive functioning. However, our knowledge base regarding several areas of study remains limited. Specifically, the temporal dynamics of visual attention has not been examined as a function of exercise, and thus our knowledge of effects of acute exercise on temporal attention remains incomplete. The purpose of the study was to examine the effect of single bouts of exercise on the temporal attention. A within-subjects design included 14 young adults (age = 20.5 ± 0.7 years; eight female) to assess exercise-induced changes in performance during an attentional blink (AB) paradigm. The AB employs a rapid serial visual presentation (RSVP) where stimuli such as letters or digits, are presented successively at a single location at rates between 6 – 20 items per second. Participants completed a VO₂ max test to determine their cardiorespiratory fitness. On subsequent days, task performance were collected while participants complete an AB task before the start of and after an intervention consisting 30 min of either aerobic exercise (60% - 70% of VO₂ max) or a seated rest control. Results indicated better performance on the AB task following aerobic exercise relative to the resting session, in particular with task conditions requiring high-demand cognitive processing (i.e., T1/T2 response accuracy). Collectively, these findings will indicate that single, acute bouts of moderately-intense aerobic exercise (i.e. walking) may improve the temporal attention, and further support the use of moderate acute exercise as a contributing factor for increasing attention.

- 181 - The yersinia response to simulated microgravity: What can we learn about bacterial virulence from a space-like environment Sandeel Ahmed, Texas Southern University; John Eunson, Texas Southern University; Jason Rosenzweig, Texas Southern University

Manned space exploration has created a need to evaluate the effects of microgravity on pathogenic and opportunistic microbes which astronauts could carry with them to the International Space Station and beyond. *Yersinia pestis* (YP) causes bubonic, septicemic, and pneumonic plague and is capable of killing infected patients within 3 to 7 days. In this study, simulated microgravity (SMG), using a rotating wall vessel, was used to challenge both a parental YP strain and its *AymoA* isogenic mutant (devoid of the histone-like protein YmoA which regulates gene expression). SMG's effects on proliferation, antibiotic resistance, cold growth, type three secretion system (T3SS) function, and virulence of both strains were evaluated. SMG reduced both strains' T3SS expression and function which likely accounted for the reduced host cell cytotoxicity observed; however, SMG did not enhance the virulence potential of YP in both cell culture and murine infection models. Interestingly, however, SMG did enhance the virulence potential of the YP *AymoA* isogenic mutant during a murine infection in a T3SS-independent manner. Taken together, SMG appears to influence different YP strains in distinct manners, and a broader view of additional YP mutants is warranted to gain a better insight into the YP SMG response.

045-3. Cell and Molecular Biology Poster Session

Cell and Molecular Biology

Poster Session

Participants:

- 182 - *Drosophila melanogaster* and the role of genetic background in eggshell phenotype Laura Youngblood, St. Edwards's University

Genetic variation between individuals can lead to differences in the expression of traits. For example, although 70% of all Europeans diagnosed with cystic fibrosis have the same genetic mutation, these individuals can display a wide range of disease severity, even when environmental conditions are held constant.

This suggests that understanding the effects of genetic background can be important in trying to diagnose and properly treat human disease, as different patients may present with variations in disease severity and may also respond differently to a particular treatment regimen. Here, we used the fruit fly, *Drosophila melanogaster*, as a model system to explore the effects of genetic background on the expression of mutations in the Epidermal Growth Factor Receptor (EGFR) pathway. The EGFR pathway is critical for the patterning of the *Drosophila* egg chamber and the formation of the dorsal respiratory appendages. To examine the effects of genetic background in the EGFR pathway, flies of two different genetic backgrounds, Oregon-R and Samarkand, were used. The mutations blistered, spitz, star, and argos were examined in the two backgrounds for their effects on dorsal appendage placement along the anterior-posterior axis of the eggshell. Although the various mutations did change the anterior-posterior positioning of the appendages, these phenotypes were not sensitive to genetic background, with the mutations showing the same effects in both Ore-R and Samarkand. This type of investigation helps to shed light on how naturally occurring genetic variants may contribute to trait variation.

183 - *Escherichia. Coli* Starvation Induced L-Form Morphology and Cell Division Eugene Johnson, Collin College

Wild type *E. coli* are Gram-negative, facultative anaerobic, non-sporulating bacteria with a rod shape morphology approximately 2.0 µm long and 0.5 µm in diameter. In general, *E. coli* strains are a symbiotic part of the human gut microbiota. However, numerous strains of *E. coli* are pathogenic, causing a range of diseases from gastroenteritis to urinary tract infections. *E. coli* can survive independently in a nutrient deplete environment for a finite period of time. This starvation can stress the organism and may cause it to change morphology during cell division into a cell wall deficient state that is referred to as the L-form. In these experiments, we show that under starvation conditions the HB101 strain of *E. coli* change into the L-form and persist as viable bacteria. The resulting cell division, completed without a cell wall, may be an energy conservation adaptation to resources limitation. In these experiments, a single colony of *E. coli* HB101 strain was maintained at 37° C in a solution of LB broth and water for 3 days. A time-course study of this culture was monitored for viability and morphology based on periodic culture on LB plates and by direct observation of cells using light microscopy. The *E. coli* cells in these experiments demonstrated a progressive change in cell morphology over time. Initially, observations show a typical wild type rod structure that by 28 hours began to form a long filamentous morphology, likely due to the inability to produce a septum. By 72 hours, the L-form morphology became evident after some cells appear to burst through the filament wall. At this time-point, the culture was transferred onto a fresh LB plate containing an inhibitory concentration of a beta lactam antibiotic. This step should eliminate wild type and leave only the L-form bacteria. This methodology offers several advantages in the study of L-form bacteria, providing a controlled system in which the L-form of *E. coli* can be grown and, enabling the study of autonomous L-form cell division. This will also provide an opportunity to study the stability of the L-form in culture and, its potential to transition back to wild type morphology by either modifying nutrient availability or antibiotic concentrations. Supporting the viability of these L-form bacteria in this system is the appearance of budding cells from L-form cells. This work presents a method for the initiation, selection, and maintenance of the L-form morphology of *E. coli* in cell culture and, provide a means to further study this poorly understood morphology.

184 - Amounts of DNA topoisomerases induced by interleukin-2 in HuT 78 cells Paul David Foglesong, University of the Incarnate Word; Rajeev Sajana Nair, University of the Incarnate Word; Nikita Kailash Gupta, University of the Incarnate Word

The activities of DNA topoisomerase I, DNA topoisomerase II α , and DNA topoisomerase II β are induced in three transient peaks in HuT 78 cells, a human T cell lymphoma cell line, within 12 hrs after treatment of the cells with 1,000 units of interleukin-2 (IL-2)/ml. The identities of these DNA topoisomerases were determined by immunoprecipitations of the enzymes from nuclear extracts of IL-2-treated HuT 78 cells using specific polyclonal antibodies. These results have been confirmed by ELISAs and western blots using specific monoclonal antibodies. The amounts of each of these three DNA topoisomerases were determined by ELISAs, and the results were compared to the specific activities of the enzymes. There is no direct correspondence of the amounts of any of these enzymes with the profile of its specific activity in the 12 hours following IL-2 treatment of the cells. These results suggest that the biochemical basis for the observed activation of these three enzymes is primarily post-translational modification (such as phosphorylation and/or SUMOylation which have been described for each) rather than increased synthesis/degradation of these proteins.

185 - Black Currant Nectar Reduces Muscles Damage and Inflammation Following a Bout of High-Intensity Eccentric Contractions Emily B Flieller, The University of the Incarnate Word; Alexander Hutchison, The University of the Incarnate Word

This investigation determined the efficacy of black currant nectar in reducing symptoms of exercise-induced muscle damage. Sixteen college students were randomly assigned to drink either 16 oz of black currant nectar (CurrantC) or a placebo (PLA) twice a day for eight consecutive days. A bout of eccentric knee extensions (3 x 10 sets @ 115% of 1RM) was performed on the fourth day. Outcome measures included muscle soreness and blood markers of muscle damage (creatinine kinase, CK), inflammation (interleukin-6, IL-6), and oxygen radical absorbance capacity (ORAC). Consumption of black currant nectar reduced CK levels at both 48 (PLA = 82.13% vs. CurrantC = -6.71%, p = 0.042) and 96 h post exercise (PLA = 74.96% vs. CurrantC = -12.11%, p = 0.030). The change in IL-6 was higher in the placebo group (PLA = 8.84% vs. CurrantC = -6.54%, p = 0.023) at 24 h post exercise. The change in ORAC levels was higher in the treatment group (CurrantC = 2.68% vs. PLA = -6.02%, p = 0.039) at 48 h post exercise. Our results demonstrate that consumption of black currant nectar prior to and after a bout of eccentric exercise attenuates muscle damage and inflammation.

186 - Do essential oils affect the presence of *Salmonella* in ground beef? Olivia Gonzalez, St. Edward's University; Patricia J. Baynham, St. Edward's University

The antimicrobial effect of onion and rosemary essential oils (EOs) against GFP *S. St. Paul* and *S. Typhimurium*, and inoculated in ground meat (93% meat 7% fat) during refrigerated storage (4± 2 °C) for 48 hours was evaluated. The minimum inhibitory concentration (MIC) value for both EOs on *S. Enteritidis* was 3.90 µl/ml. Both evaluated EOs in all tested levels, showed antimicrobial effects, with microbial populations reducing along time storage. The application of EOs in processed meats can be used to control pathogens during refrigerated shelf-life.

187 - Identification and characterization of auxin signaling mutants of *Arabidopsis thaliana* Kevin Chappell, The University of Mary Hardin-Baylor; Andrew W. Woodward, The University of Mary Hardin-Baylor

Auxins are plant hormones that regulate most aspects of plant growth and development, including phototropism, gravitropism, root system structure, and vascular development. 1-naphthaleneacetic acid (1-NAA) is a synthetic analog of the hormone indole-3-acetic acid (IAA), which is the main auxin found in plants. Unlike IAA, 1-NAA bypasses plasma membrane transport proteins that are often identified in mutant screens. Therefore, using 1-NAA increases the likelihood of

recovering auxin signaling mutants rather than auxin transport mutants. I have isolated mutant *Arabidopsis* plants that do not respond to the 1-NAA hormone. I screened more than 15,000 EMS-mutagenized seeds on plant nutrient medium supplemented with 400 nM 1-NAA. After a week of growth, I observed the plates to look for signs that a specific seedling did not respond to the 1-NAA hormone. These signs include long roots with few to no lateral branches and agravitropism (failure of roots to grow downward). After I identified a mutant, I isolated it and allowed it to grow so that I could analyze progeny phenotypes to determine whether a heritable mutation is present. Next, I plan to extract DNA and compare the mutant DNA to that of wild-type *Arabidopsis*. In this work, I seek to discover genes that control the auxin signaling pathway involved in 1-NAA responses. This will help further our knowledge of auxin and how it is utilized by the plant. Learning more about how auxin signals development may allow improvement of agricultural methods and increased productivity.

- 188 - Role of leukocyte GPR120 in n-3 vs. n-6 PUFA induced atheroprotection *Nhung Phan, St. Edward's University; Swapnil Shewale, Wake Forest University; Xin Bi, Wake Forest School of Medicine; Xuewei Zhu, Wake Forest School of Medicine; Elena Boudyguina, Wake Forest School of Medicine; John Parks, Wake Forest School of Medicine*
Long chain n-3 polyunsaturated fatty acids (PUFA) such as docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) found in fish and fish oil (FO) are atheroprotective, yet the mechanism behind atheroprotection by n-3 PUFA was relatively unknown until the discovery of G-coupled protein receptor 120 (GPR120). GPR120 is an anti-inflammatory n-3 PUFA receptor and is not activated by n-6 PUFA. In current study, by generating leukocyte GPR120 KO mice in a LDL^{-/-} background, we proposed to differentiate lipid lowering vs. anti-inflammatory effects of n-3 PUFAs in atheroprotection. We hypothesized that leukocyte GPR120 KO mice that are fed n-3 PUFAs will have exacerbated atherosclerosis when compared to their GPR120 WT counterparts, whereas atherosclerosis in GPR120 KO and WT mice fed n-6 PUFAs should not differ from one another since n-6 PUFAs don't activate GPR120. Botanically derived Omega-3 vs. Omega-6 polyunsaturated fatty acid enriched Echium and Borage oil diets were atheroprotective to the same extent of Fish oil when compared to the saturated fat diet, Palm oil. A lack of leukocyte GPR120 did not have a significant effect on plasma cholesterol, plasma triglycerides or atherosclerosis. Diet dependent reduction in plasma lipids and atherosclerosis was seen. These data suggest that botanically derived Echium and Borage oil impart comparable atheroprotection, however the anti-inflammatory effects of leukocyte GPR120 plays a minor role in atheroprotection.

- 189 - Simulated microgravity induces epigenetic changes *Nkem Azu, Texas Southern University*

Astronauts are constantly being exposed to different stress factors, which include radiation, microgravity and confinement. These environmental stressors are known to increase bone loss, decrease muscle mass and reduce immune function. Our objective is to investigate the hypothesis that modeled microgravity alters gene expression through epigenetic changes. We determined whether modeled microgravity induces these epigenetic changes by examining the expression of genes known to be downregulated by hypermethylation such as the DNA methyltransferases (DNMT1, DNMT3a and DNMT3b) and histone deacetylase (HDAC1). To achieve this, murine macrophage cell lines were grown under normal and simulated microgravity conditions with and without demethylating agent 5-aza-2-deoxycytidine (DAC) and protein expression was examined after DAC treatment. We have examined the expression of the proteins DNMT1, DNMT3a/3b and HDAC1 and found that cells grown under simulated microgravity conditions produced lower protein levels compared to cells grown under normal gravity conditions in the presence of the demethylating agent DAC. Thus epigenetic modifications occur

under modeled microgravity.

- 190 - The effects of organophosphate pesticides on larval central nervous system development in *Drosophila melanogaster* *Michelle Victoria, St. Edward's University*
To further understand the toxic effects of organophosphates on insects, the effects of organophosphate exposure on development of the central nervous system in *Drosophila melanogaster* larvae were studied. Organophosphates are known to have a negative effect on the functioning of the adult insect central nervous system; here we investigate the effects on the development of the larval central nervous system. Flies were exposed to dichlorvos in food media at concentrations of 1.5 ppb and 15.0 ppb. DMSO containing food was used as a control. If dichlorvos exposure negatively affects the development of the larval central nervous system, then damage could be seen as dead CNS tissue (monitored by Trypan blue staining) and irregular CNS patterning (monitored by embryo BP102 antibody staining). Contrary to our predictions, larval brains dissected and stained with Trypan blue did not show extensive cell death. BP102 antibody staining was ineffective, and will require protocol modifications to achieve staining at late embryo/early larval stages. The larval central nervous system showed no damage or negative effects from exposure to food containing dichlorvos, however there was a dose dependent effect on adult viability. Our results suggest that dichlorvos may not have negative effects at larval stages. Studies of this kind are important considering the recent decline in insect pollinators.

- 191 - The role of *orthodenticle* in early embryonic patterning in *Drosophila simulans* *Stephanie Pace, St. Edward's University*

The *orthodenticle* (*otd*) gene of *Drosophila melanogaster* is required for proper patterning and development of the head. Previous research has shown high levels of intraspecific sequence variation within an *otd* regulatory region, which leads to a difference in the pattern of expression of *otd* in the early embryo. Here we examine variation in this same regulatory element in the sister species *Drosophila simulans*. Comparison of *otd* expression in *Drosophila simulans* reveals a statistically significant difference in expression along the ventral boundary between *D. simulans* and *D. melanogaster*. To further study variation in this regulatory element, 21 lines of *D. simulans* collected in North Carolina were amplified for the *otd* regulatory region and sequenced. The sequence data shows that compared to *D. melanogaster*, the *D. simulans* sequence is shorter, harboring several deletions relative to *D. melanogaster*. However, similar to *D. melanogaster* most of the variation is in the center of the regulatory element and there is some evidence for multiple haplotypes which are also seen in *D. melanogaster*. Studies of this type aid our understanding of the role cis-regulatory elements play in phenotypic evolution.

- 192 - Will exposure to sub-lethal concentrations of Triclosan lead to the development of microbial tetracycline resistance? *John Watts, St. Edward's University; Lawrence Henry Edwards, St. Edward's University*

Triclosan has been shown to disrupt both gram positive and gram negative bacterial cell wall fatty acid synthesis in *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa*. Bacteria become resistant to Triclosan by upregulating efflux pumps as found in some *S. aureus* and *E. coli* strains. The *fabI* gene encodes the NADH-dependent trans-2-enoyl-acyl carrier protein reductase of fatty acid synthesis. We hypothesized that exposure to sub-lethal concentrations of Triclosan will cause tetracycline resistance in *S. aureus*, *E. coli*, and *P. aeruginosa*. A minimum inhibitory concentration (M.I.C.) test was first performed using >97% Irgasan DP-300. To expose the strains to sub-lethal concentration of Triclosan over time samples were incubated at these concentrations and an aliquot was streaked onto BHI plates every 24 hours for 7 days. One colony was isolated from each sample and incubated overnight in 5ml of BHI broth. BHI agar was made with varying concentrations of tetracycline from

512µg/ml-1µg/ml. Plates were then observed for sensitivity to the various concentrations. The wild-type bacterial strains showed no growth on any of the concentrations of tetracycline but did grow on the non-tetracycline control plate. All experimental strains showed growth on concentration ranges from 16.0µg/ml-1.0µg/ml but were inhibited above this range. This result was surprising since resistance was detected after only 24 hours of sub-lethal Triclosan exposure and this resistance did not appear to increase. In the future, we would like to determine if this resistance is due to the upregulation of efflux pumps, the mutation of *fabI* or some other mechanism.

193 - β -catenin mRNA identification and analysis as a regenerative marker in *Lumbriculus variegatus Pompeyo R. Quesada, Univ. of the Incarnate Word; Robert Alan Miranda, University of the Incarnate Word; Veronica G. Martinez Acosta, Univ. of the Incarnate Word*

The organized nervous system and regenerative capacity of the aquatic oligochaete *Lumbriculus variegatus* provides an excellent model system for the study of nerve regeneration and wound healing. Our lab has previously found that β -catenin, an armadillo protein involved in activating cell-specific transcription factors in the canonical Wnt signaling pathway, is highly expressed in the ventral nerve cord post-amputation, thus suggesting a critical role for β -catenin during regeneration. We, therefore, aim to develop a better understanding of the role of β -catenin and other molecular mechanisms involved in nerve regeneration of *L. variegatus*. We are currently developing a quantitative polymerase chain reaction (QPCR) assay to measure mRNA expression of β -catenin in *Lumbriculus*. Based on the known coding sequence for β -catenin in other annelids, we have identified a highly conserved region across species. We used a consensus sequence based on this conserved region to design degenerate primers to amplify the coding sequence for β -catenin in *L. variegatus*. After amplicon sequencing we will design QPCR primers specific for the *L. variegatus* coding sequence that can be used to analyze β -catenin transcript levels at different time points during regeneration. In our future work we predict to see changes in β -catenin mRNA at key time points during regeneration in *Lumbriculus*. We also plan to identify and evaluate transcript levels of other proteins involved in the Wnt signaling pathway that may be important for regeneration. These studies will thus strengthen our understanding of regenerative processes in invertebrates and potentially in higher order phyla such as humans.

194 - Barcoding commercially available fish specimens for possible misrepresentation and substitution. *Hannah Zoorob, Collin College; Cristy Guizar, Collin College; Chris Doumen, Collin College*

Recent advantages in species identification via barcoding has resulted in many new revelations, one of which is the mislabeling of seafood products for commercial consumption. Such species mislabeling can be the result of poor visual identification and communication along the supply chain. Of greater concern is the intentional misidentification and representation of seafood products for the sole purpose of defrauding the customers and increasing market profits. Many prepared fish samples are similar in texture and appearance, making it relatively easy to substitute high commercially valued specimens with species of lower value. This project aimed to establish an insight if such practices are common in the local area. Specimens were obtained from larger supply stores, smaller commercial venues and sushi restaurants. DNA was isolated from the specimen and barcoded using PCR methodology and COX primers. The amplified sequences were outsourced for sequencing and the resulting data compared with available sequences in the National GenBank. Data indicate a high degree of misrepresentation, especially among sushi vendors.

045-4. Chemistry and Bio-Chemistry poster session

Chemistry and Biochemistry

Poster Session

Participants:

195 - Anomalous interactions between triclosan and solvent lead to further clarification of analysis. *Jay Elliot Frey, Schreiner University; Elizabeth A Fawcett, Schreiner University; Kiley Miller, Schreiner University*

Triclosan is a pesticide marketed as an antibacterial and used in many household products. Although currently regulated by the Environmental Protection Agency (EPA), tighter regulations are desired. To determine the presence of triclosan a spectroscopic assay was used. A diazonium ion was formed and reacted with triclosan to make an azo-dye species and then quantified with UV-Vis Spectroscopy. Preliminary gas chromatography assays were conducted to discover a suitable solvent for triclosan. It was found that isopropyl alcohol dissolves triclosan quite readily; various concentrations in the environmental range were evaluated using gas chromatography. This range was then expanded upon discovering an irregularity in what should have been a linear relationship. To further analyze this anomaly, samples of less than 25µg/L were evaporated to confirm a homogenous mixture. Once the mixture was evaporated a very small sample of an unknown oily mixture was discovered. This procedure was conducted again with concentrations above 25µg/L resulting in an oily mixture that also contained solid crystals. The oil sample was then used in spectral studies conducted with an infrared spectroscopy (IR) and nuclear magnetic resonance spectroscopy (NMR). Preliminary results of the IR study revealed that this substance was primarily 2,4,6-trichlorophenol. Preliminary results of the NMR study revealed an aromatic group similar to that of an isolated triclosan, but shifted downfield with a possible alcohol group.

196 - Development of a ribozyme from the b11 group II intron for use in RNA folding studies *Cullen Soares, St. Edward's University; Jeffrey Potratz, St. Edward's University*

RNA folding is an important cellular process that is involved in many fundamental biochemical activities, such as protein synthesis (rRNA and t-RNA) and gene regulation (riboswitches). A catalytic RNA molecule (ribozyme) will be developed and used to better-understand the process of RNA folding. Previous research on RNA folding has been conducted with molecules such as the b11 and a15 γ group II introns. My research project is focused on the folding of a ribozyme derived from the b11 group II intron. Because ribozymes only perform a catalytic-cleavage event when they are properly folded, their activity can be monitored to determine the fraction of molecules that have reached a properly-folded state. Thus, they serve as good models for studying RNA folding. The b11 intron sequence was mutated through a base-pair deletion to remove the branchpoint-A base. The plasmid was then sequenced to confirm the presence of the mutation. Future work on this project involves deleting exon sequences, adding a restriction enzyme cut site on each end of the ribozyme sequence, adding a T7 promoter, and inserting the ribozyme sequence into a pUC18 plasmid. The mutations and deletions will transform the group II intron into a ribozyme that can perform a multiple turnover reaction, mimicking the b11 intron's self-splicing reaction. The cut sites and the T7 promoter will enable plasmid linearization for future in-vitro transcription. After the additions are complete, it will be possible to transcribe the ribozyme and run catalytic reactions to determine the conditions necessary for its properly-folded state.

197 - Effects of exposure to the pesticide *Imidacloprid* on growth rates of environmental bacteria *Nathan Nevitt, St. Edward's University*

Imidacloprid (IMI) is the most widely used pesticide in the world. It is a neonicotinoid insecticide used primarily by the agricultural industry to target biting and sucking insects that feed on crops. Unfortunately, IMI can also negatively affect non-target insects, such as honeybees, and possibly other organisms

such as aquatic invertebrates. The goal of this research was to investigate if IMI tolerance was present within microbial communities in soil and pond water samples that were potentially previously exposed to IMI application. The secondary goal of this research was to isolate IMI-degrading microorganisms in order to understand if this metabolism could mitigate the long-term toxicity of IMI in soil and aquatic environments. To this end, pond water and soil samples were collected in September 2013. Approximately 1 ml of pond water or 25mg of soil was added to 10 ml of nutrient broth (NB) and incubated at room temperature for two days. One set of the cultures was transferred to control culture media (NB) while another set of test cultures was transferred to NB with 10-3M concentration of IMI. Cultures were incubated for twenty-four hours. The growth of the cultures was quantified by measuring optical density on a spectrophotometer at 600nm for control and IMI. Results indicate that test cultures, exposed to 10-3M IMI, had higher cell density and faster exponential growth periods. Future research will focus on confirming that microorganisms in these samples can degrade IMI, and use IMI as an energy source.

- 198 - Purification and partial characterization of 4T1 cell cytotoxins from ginger (*Zingiber officinale*) Trevor Burrow, Department of Chemistry, Wayland Baptist University; Jessica Rose Kenneson, Wayland Baptist University; Adam Reinhart, Wayland Baptist University; Gary O. Gray, Department of Chemistry, Wayland Baptist University

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

- 199 - Spectral interrogation of dyes Steven Sunday, SFASU; Alex Nelson, SFASU; Darrell Fry, Stephen F. Austin State University

Dyes are used routinely in our culture; therefore, the utility and safety of food dyes is of importance to our culture. . Some common food dyes include, yellow #5 , blue #1 and red #40. Dyes are also used as fluorescent probes. For instance, fluorescein is a common fluorescent probe. In this presentation, we present the UV/VIS and IR data for common food dyes in various solvents. We draw some conclusions about how the solvent polarity shifts the peaks in the UV/VIS spectra. We will also present some molecular calculations of the predicted UV/VIS spectra for the various food dyes. We then show some IR spectra of common food dyes, and again compare it to computational predictions for the spectra. Unlike the food dyes, the UV/VIS of fluorescein shows more interesting features. In nonpolar solvents, the UV/VIS spectra is completely different

than in polar solvents. We explain the different UV/VIS spectra using the keto-enol tautomerization of fluorescein.

- 200 - Usage of tetrahedral and octahedral organotin compounds as cytotoxic materials against cancer cells Jonathan Arturo Muniz, UTEP; Armando Varela, UTEP; Renato Aguilera, UTEP; Keith Pannell, UTEP

The use of organometallic compounds as cytotoxic materials in cancer research has been providing good results in the last few years. Organotins have shown great activity as biocides as they are highly cytotoxic but they lack cytoselectivity. On the other hand, ruthenium based compounds have shown great cytoselectivity, but are not very active biocides, having a low cytotoxic capacity. It was hypothesized that using iron should yield a similar effect and, united with a tin based molecule, the cytoselectivity should increase. Nine organometallic compounds containing tin, and some containing iron as well, were dissolved in DMSO using milli-/micro-molar concentrations and tested against different cell lines such as MDA-MB231 and Jurkat grown in DMEM and RPMI media, respectively. The techniques used were classic Cytotoxic assays previously developed in the laboratory. Readings after 24 and 48 hours using a mixture of Propidium iodide and Hoechst were used to determine the cytotoxicity. The most cytotoxic compounds were [(C5H5)Fe(CO)2]2Sn(t-butyl)2, Bn2SnCl2, and (o-MeSBn)2SnCl2 with half maximal cytotoxicity concentration of 107, 11.63, and 0.445 micro-molars respectively. Further studies with Annexin v and Propidium iodide demonstrated the pathways of death cell through either apoptosis or necrosis depending on the compound. This demonstrated that the lack of iron actually increases the cytotoxicity and suggests that the octahedral structure might be more adept to cytotoxicity.

045-5. Conservation Ecology poster session

Conservation Ecology

Poster Session

Participants:

- 201 - Analysis of Soil Restoration Treatments on Fungal, Eubacterial and Archaea Microbiomes: Implications for Black Capped Vireo Habitat Restoration Efforts Samantha Parsons, St. Edward's University; Dylan Fox, St. Edward's University; Laurie Cannon, St. Edward's University; Cody Ramirez, St. Edward's University; Lisa O'Donnell, City of Austin, Balcones Canyonlands Preserve; Charles Hauser, St. Edward's University

Plants associate with root microbiota distinct from microbial communities present in surrounding soil. The microbiota colonizing the rhizosphere (immediately surrounding the root) contribute to plant growth, carbon sequestration and phytoremediation. Here we report the pyrosequencing of the fungal, eubacterial and archaea rRNA genes of soil microbiomes from two positive control sites and three habitat restoration sites within the Vireo Research Area and Wild Basin Wilderness Preserve to test the hypothesis that soil remediation treatments can establish microbial communities characteristic of black capped vireo habitat. The three habitat restoration sites consist of 5 mulch sock treatments: 1) control treatment (mulch socks only); 2) onsite mulch (juniper and hardwoods); 3) onsite composted mulch (juniper and hardwoods); 4) Mulch and biochar combined; 5) composted mulch and biochar combined. Using primers designed to amplify each kingdom we have identified the following taxa from the treatment sites: 1387 fungi, 2697 eubacteria, and 96 archaee using QIIME and the Greengenes and Silva databases. Data from the control sites are currently being sequenced. Preliminary principal coordinate analyses for all three kingdoms suggest that microbial populations vary in response to both season (sampling date) and remediation treatment. We will present treatment-specific characterizations of both alpha and beta diversity for all three kingdoms. The results of this research will hopefully provide insights into a wider scope of ecological restoration strategies

using soil restoration treatments.

- 202 - Carolina Wren fledgling survival in urban and forested ecosystems *Diane Neudorf, Sam Houston State Univ.; Ashley Bogrand, Sam Houston State Univ.*

Fledgling songbirds experience high levels of mortality the first week they leave the nest because they are unable to fly well and they are inexperienced with predators. Urbanized habitats present additional challenges such as reduced cover and introduced predators. Carolina Wrens (*Thryothorus ludovicianus*) are resident songbirds of the eastern United States in which pairs stay together and guard a territory throughout the year. They are found in a wide variety of forested habitats including residential areas with mature trees and shrubs making them an ideal species in which to investigate fledgling survival in urbanized ecosystems. We compared Carolina Wren fledgling survival, movement and habitat use in a forested (natural) compared with an urbanized ecosystem. We predicted that fledgling survival would be lower in the urbanized ecosystem due to the presence of non-native predators and due to the lower availability of desirable habitat for fledglings to occupy. We radio-tracked fledglings for up to two weeks post-fledge and mapped their movements. Our findings suggest that fledgling survival is lower and their movements much more limited in the urban ecosystem. High predation on fledglings from domestic and feral cats may explain the lower success in the urban ecosystem but further investigation is needed.

- 203 - Models of potential geographical distribution of endemic and endangered hummingbird species in Mexico *Ana Laura Cavazos, University of Texas- Pan American; Mayra Oyervides, University of Texas-Pan American; Carlos Lara, Universidad Autónoma de Tlaxcala; Teresa Patricia Fera, University of Texas-Pan American*

Habitat transformation is one of the main threats for the great biological richness and high number of endemic species in Mexico. It is crucial to document the distribution of Mexican species, particularly those that are endemic, in a category of risk, or that lack detailed geographic information. In this study we developed maps of potential distribution for some endemic species of hummingbirds in Mexico. A database with detailed information about the geographical distribution of 23 endemic species of hummingbirds was compiled by the exhaustive review of literature, personal databases of contributors, and online databases (e.g., GBIF, REMIB). Potential distribution maps were created using a maximum entropy algorithm and 19 climatic variables. These maps were evaluated quantitatively and qualitatively. During the quantitative evaluation, the presence was divided into the training data (70%) and test data (30%), they were assessed by the AUC (Area Under the Curve), in the ROC statistic. In the qualitative evaluation, experts evaluated the maps according to their experience. The maps with the best evaluations were edited to obtain more realistic distribution maps of the studied species. The editing of maps was performed using biographic provinces and land cover/use maps from INEGI. Maps of potential distribution of endemic hummingbirds show areas where suitable habitats exist. Further work should include field work data to corroborate the presence of species in these areas. In addition, predictions of potential distributions under the influence of climatic change are ongoing.

- 204 - Invertebrate predator recognition and avoidance in the endangered Barton Springs salamander, *Eurycea sosorum* *Dominic DeSantis, Texas State University-San Marcos; Drew R Davis, University of South Dakota; Caitlin Gabor, Texas State University-San Marcos*

The Barton Springs salamander, *Eurycea sosorum*, is a federally endangered, fully aquatic salamander endemic to Barton Springs in Travis County, Texas. Previous research has shown the importance of fish as predators, but little is known about the role of potential invertebrate predators. Both crayfish and dragonfly larvae occur in Barton Springs and may be predators of *E. sosorum*. Using captive-hatched (predator-naïve), adult

salamanders, we examined the antipredator response of *E. sosorum* to chemical cues from one of the following treatments: (1) crayfish (Decapoda: Cambaridae), (2) dragonfly larvae (Odonata: Aeshnidae), (3) non-predatory aquatic snails (Pulmonata), or (4) a blank water control. Salamanders decreased activity (antipredator behavior) in response to crayfish but not to chemical cues from dragonfly larvae. The responses to dragonfly larvae, snail, and blank water stimuli did not differ, which may suggest that dragonfly larvae are not strong predators of salamanders. Responses also suggest the role of innate predator recognition which is similar to the results of prior studies with fish. The lack of a response to dragonfly larvae is unexpected, as many studies have illustrated their prominent role as tadpole predators. Future work is needed to explore actual predation rates in the field as well as any non-lethal, fitness reducing effects these predators may have on individuals.

- 205 - Population density of feral hogs (*Sus scrofa*) in Hill County, Texas *Tracina Nicole Maiden, McLennan Community College; Brittany Le, McLennan Community College; Jenni Hranek, McLennan Community College; Jennifer Benitez, McLennan Community College; Donna Hamilton, McLennan Community College; Stephanie Randell, McLennan Community College*

Feral hogs, (*Sus scrofa*) can be dated back to the ice age and had originated from Spain in the early 1500's. In Texas, the feral hog history can be traced to the domestic breeds that were originally brought to North America, including wild domestic hogs, European boars, and a product of the two (Taylor 2013). In 2012, the estimated feral hog population in Texas was 2.6 million, with the density ranging from 1.3-2.4 hogs per square mile (Timmons et al. 2012). According to Texas A&M Agrilife Extension, agricultural damage due to feral hog activity exceeds \$52 million every year. The objective of this study was to determine the latency to first detection (LTD) and the population density for feral hogs in Hill County, Texas. Researchers used six standardized trap cameras with a view range of up to sixty feet to monitor the area. (Ahumada 2011). Population density was calculated using established wildlife protocols (Yarrow 2009). LTD was 9 days. Feral hog populations in Hill County make up two percent of the total population in Texas. Trap cameras showed feral hogs regularly feeding at deer feeder stations. The regular practice of feeding deer may be contributing to increases in feral hog populations. A significant number of other species, including up to 30 raccoons/night, regularly used feeder stations. Studies examining population density and relative abundance of species using feeder stations could illuminate the role of deer feeding practices on wild populations.

- 206 - Shrub encroachment dynamics and the implication for a wild population of parrotlets in a tropical savanna of Venezuela. *Soraya Delgado, University of Texas at Brownsville; Heather Alexander, University of Texas at Brownsville; Karl S Berg, University of Texas at Brownsville; Steve Beissinger, University of California at Berkeley*

Delgado, S.1*, Alexander, H. D.1, Berg, K.S.1, and Beissinger, S.R2. 1Department of Biological Sciences at Brownsville,

Science Policy and Management, University of California, Berkeley, Berkeley, CA 94720-3114. *Presenter Abstract: The invasion of woody plants into grassland dominated ecosystems, or shrub encroachment, is a worldwide phenomena usually attributed to anthropogenic interference and climate change. However, the implications for bird communities such as parrots, are unknown. Although, most studies have focused on ecosystems in temperate and arctic biomes, less is known about how shrub encroachment is affecting tropical ecosystems, which are predicted to respond differently to future climate change scenarios. Especially important to understand is how shrub encroachment processes affect population structure of animals that depend on grasslands, which requires long-term

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demographic data during periods in which shrub encroachment occurs. Green-rumped parrotlets (*Forpus passerinus*) are a convenient model to understand such linkages because there exists annual demographic information since 1988, a period that coincides with important changes in grassland communities which they inhabit. This project quantifies the rate of shrub encroachment using historical aerial/satellite imagery and ground-based characterization of plant communities in order to compare to fluctuations in parrotlet population structure over the past quarter century. A second phase of the study estimates edible biomass estimates of parrotlet food abundance in areas with different degrees of shrub encroachment by extrapolating to historical estimates of fecundity and density of food plants. Finally, edible biomass estimates will be compared to parrotlet population parameters

207 - Vehicle Induced Mortality in Raccoons (*Procyon lotor*)
Michelle Ray, East Texas Baptist University; Troy A Ladine, East Texas Baptist University

Mandibles of 33 raccoons (*Procyon lotor*) killed by collisions with motor vehicles were collected in Harrison County, Texas from 1 April 2012 to 1 October 2013. Age data were collected from the mandibles of raccoons using the five age classes of Grau et al. (1970). Distribution of age classes for raccoons was 8:14:3:3:0. The distribution of age classes was analyzed for randomness using Chi-square analysis based on a distribution from the literature (Ladine 1995). The distribution of road-killed raccoons in Harrison County, TX did not deviate from the expected distribution ($X^2 = 0.123$, $p = 0.9972$). Distribution of the collected data do not deviate from the expected indicating that road mortality of these species may be random with evolutionary consequences governed by genetic drift.

208 - Wing Loads of the Migratory Monarch Butterfly (Lepidoptera: Danaidae) Before, During and After a Historic Texas Drought. Joshua Shayne Huckabee, Temple College; Jason Locklin, Temple College

Monarch butterflies are well-known for annual migrations. However, little is known about the variability in physical characteristics of individuals arriving at various times through the migration, i.e. early vs. late, or under stressful conditions such as drought. In the summer of 2011, central Texas experienced a severe drought, and the climatic extremes and loss of nectaring and host plants may have affected migrating monarchs that year and in subsequent years. The purpose of this study was to quantify variability in wing loading through the migration during pre-drought (2010), drought (2011), and post-drought (2013) years. Daily census counts were made during the migration. Each week of all three years, individuals were captured, sexed, weighed, scanned laterally on a flatbed scanner, and released. Surface areas of wings were regressed from linear measurements of the left forewing to calculate wing loads of each individual. Monarchs arrived in central Texas in October of all three years and were observed for eight weeks. Individuals arriving early in the pre-drought migration period had heavier wing loads than those arriving later. During the drought and post-drought years, however, wing loads did not differ. Specifically, all wing load values during and after the drought were consistent with the wing loads of those arriving late in the pre-drought migration. We attribute this lack of wing load variation in 2011 and 2013 to the reduced productivity of nectaring and host plants. These results suggest that monarch population recovery from such harsh conditions may take several years beyond stressful event itself.

045-6. Freshwater Sciences Poster Session

Freshwater Science

Poster Session

Participants:

209 - Go snail! Grow: Hatchling growth of *Pomacea maculata* under predation stress Amber Danae Cochran, Southwestern University

Native to South America, two apple snail species within the genus *Pomacea* exhibit global invasive distributions including Asia, Europe and North America. One of these species, *P. maculata* (formerly *P. insularum*), currently spreads across the southeastern United States, facilitated by its large size and high fecundity. In Florida, this species competes with the only native apple snail in the US. New populations continue to establish across the Gulf Coast and *P. maculata* may thrive in particular nutrient-enriched habitats. Little published research exists on *P. maculata* hatchlings, which emerge at approximately 1-mm in size and blend into aquatic habitats. This study examined how hatchlings survived and grew under the environmental stress and chemical cues of a potential native predator, the red-eared slider turtle (*Trachemys elegans scripta*). The experiment included sets of 10 hatchlings (N=8) fed lettuce and grown in approximately 250 mL of water, which we changed every other day. Our four treatments included: 1) a control using distilled water, 2) 50% water from a turtle fed mealworms, 3) 50% water from a turtle fed snail meat, and 4) 50% water from a turtle fed a vegetarian diet. In five weeks, snail hatchlings grown in turtle cue water showed significantly higher growth rates (1-way ANOVA) than in distilled water, suggesting some effect of nutrient enrichment. However, snail hatchlings present in water from a turtle fed snail meat also experienced high mortality, indicating possible negative conspecific effects. Understanding the sensitivity of hatchlings may be the key to decreasing the spread of invasions.

210 - Go young snails: Origins of invasive *Pomacea maculata* in Louisiana Carson Savrick, Southwestern University; Romi Burks, Southwestern University; Kenneth A Hayes, Howard University

Invasive species negatively impact ecosystems by competing with native taxa, altering habitats and facilitating the introduction of parasites. *Pomacea maculata* (Ampullariidae) is a rapidly spreading non-native snail species that threatens native biodiversity, agriculture and public health. Fundamental questions investigated through an integrative approach, combining ecology and molecular biology, have great potential to yield insights into processes shaping invasion success. For example, DNA sequences can inform the geographic origins of introduced populations, and provide insights into the pathways of spread. Previous studies indicate two introductions of *P. maculata* into the United States, initially Florida and Texas, from populations in Brazil and Argentina. More recently data indicate that snails have spread to Alabama via Florida, yet there no data exist on the origins of established Louisiana populations. To test an initial hypothesis that a Louisiana population resulted from spread out of geographically closer Texas, we sequenced mitochondrial cytochrome c oxidase subunit I from 43 Texas and 4 Louisiana snails and carried out phylogeographic analyses with sequences from Genbank of *P. maculata* from their native range. Louisiana snails were a single haplotype genetically identical to individuals collected from Everglades National Park, Florida. Thus, preliminary data indicate that snails continue to spread westward from Florida. The exact routes of spread await determination, and are the subject of continued efforts that will include increased sampling from introduced populations in Louisiana to improve resolving power. Although preliminary, these data have profound implications for understanding the continued spread and potential impacts of the highly damaging invasive species.

211 - Like water for snails: A case study of Emerald Lake as a system invaded with apple snails (*Pomacea maculata*) Alex Petrucci, Southwestern University; Amy Elizabeth Miller, Southwestern University; Alexandria Hill, Southwestern University; Romi Burks, Southwestern University

Connectedness of habitats through urban sprawl holds multiple implications for invasive species. Emerald Lake (Missouri City, Texas) comprises a freshwater lake surrounded by a community featuring lakeside homes. We investigated an established population of apple snails at Emerald Lake and positively identified the invasive snails as *Pomacea maculata*, confirming

their range expanding into this Fort Bend County lake. New source populations occur as the invasive species spreads through water channels, the aquarium trade, and dumping. Public health, environmental, and safety concerns exist should any of the source populations contain snails infected by parasites or facilitate invasion of disturbed habitats. Surveys done in 2010 and 2013 at Emerald Lake revealed a population dominated by mature snails as on-site visitations included few juveniles. Emerald Lake provides a number of artificial substrates, such as bridges, for snail oviposition, prompting investigation into population size. In our study, we confirmed collected data, the shoreline distribution of egg clutches, the quantity of intact egg clutches, and the quantity of recently hatched clutches ('scars') to see where snails might congregate. We examined the quantity of intact egg clutches and broken egg scars using a frequency distribution map designed in Arcmap 1.0 and found 'hot spots' among areas of the lake. We recommend individuals involved in developments near the lake become informed of the threats apple snails present to the freshwater ecosystem and public health. If efforts occur to crush any pink egg clutches, the population of apple snails present in Emerald Lake can be better controlled.

- 212 - Mercury-contaminated riparian spiders along three east Texas rivers pose a potential risk to song birds *Cleveland H Powell, Texas Christian University; Gretchen Lee Gann, Texas Christian University; Matthew Murray Chumchal, Texas Christian University; Ray Drenner, Texas Christian University*

Mercury (Hg) is a global atmospheric pollutant that can be harmful to wildlife. Because methyl mercury (MeHg) is only produced in aquatic ecosystems, it is assumed that Hg contamination poses a risk to aquatic but not terrestrial wildlife. However, recent studies have shown that MeHg can be transported via emergent aquatic insects from freshwater to terrestrial ecosystems where it may pose a risk to terrestrial wildlife that consume Hg-contaminated insect prey. Tetragnathid spiders are a key link between aquatic and terrestrial ecosystems because they consume emergent insects and become contaminated with MeHg. Tetragnathids can have high concentrations of Hg and therefore may pose a threat to the health of songbirds that consume them. We collected tetragnathid spiders from 26 riparian sites along Big Cypress Bayou flowing into Caddo Lake and two tributaries (Little Cypress Bayou and Black Cypress Bayou) and determined their Hg concentrations. We then determined potential Hg risk to four species of songbirds (American Robin, Eastern Bluebird, Carolina Wren, Chickadee) known to consume spiders. Average site-specific MeHg concentrations in spiders ranged from 34.5 to 174 ng/g wet weight and were high enough to pose a risk to the songbirds. Methyl mercury concentrations in spiders were significantly different between the rivers and lowest in Big Cypress Bayou below two large impoundments. This is the first study to suggest that the fragmentation of rivers with main-stem impoundments may reduce the downstream mercury contamination of riparian spiders and the risk of these spiders to song birds.

- 213 - The Fishes of Texas Project and website: overview and future directions *Dean A Hendrickson, University of Texas at Austin; Adam E Cohen, Texas Natural History Collections, University of Texas Austin; Ben Labay, Texas Natural History Collection, University of Texas Austin*

Fishes of Texas Project (FoTX - www.fishesoftexas.org) compiled Texas fish species occurrence records from 42 museums and applied rigorous quality control and data normalization/standardization to result in 124,415 specimen-based records collected between 1851 and 2010 by 5,924 collectors. 88,348 records from 7,868 unique inland localities were manually georeferenced with placement error estimates. 8,460 Gulf records and 18,923 inland records from neighboring Mexican and U.S. states have been partially processed. Georeferenced records were plotted and specimens and original data associated with 4,107 geographic outliers flagged as potential identification or location errors that were corrected or

confirmed. 31 species occurrences were discovered in major river basins where they were previously not believed to occur. The online database can be queried, mapped, and records downloaded, and powerful species distribution models for most Texas freshwater fishes downloaded. These models have been used for projecting impacts of climate change on fish distributions, finding and addressing knowledge gaps, exploring new ways to do bioassessment without reference sites, and for comprehensive conservation planning. We continue adding specimens to our collection and online database and improving the website, but project focus is shifting to diverse applications of the data and addition of new, partly non-specimen-based occurrence data. New fieldwork is planned to address priorities determined by analysis of the FoTX database and we are also planning "bioblitzes" with public involvement, leveraging our iNaturalist project and use of photos as vouchers. We are also working on improved fish identification keys and updating and improving species accounts.

045-7. Mathematics Poster Session

Mathematics
Poster Session
Participants:

- 214 - Conical Helix Curves Simulating Conical Gears *Cheddi Charles, UGROW at Midwestern State University*

This project focused upon a single aspect of a much larger project of Dr. Salim Azzouz's research. The larger project consists of designing a geared continuously variable transmission (CVT) for use in generating wind turbine electricity. A CVT would be able to take the variable angular velocity input from the wind turbine and transform it into a constant angular velocity output, thus driving the electric generator. Our goal was to find parametric equations that would map out curves on surfaces which would simulate gear teeth on gears. Two requirements were placed upon the curves: 1) they must be of equal distance from each other on the surface, and 2) the angle of the teeth curves must remain constant along the surface. Several types of gear surfaces were designed (and programmed) during our project. The first surface was a cone with helix curves placed upon the length of the cone. However, the equal distance curves changed angles along the cone length. The second surface satisfied requirement 2). But, this changed the surface into an acorn shape. The produced curves had unequal distances between them. Further investigation proved that while the negative effects of each surface can be minimized, it is impossible to satisfy both requirements on the same type of surface. Future research will possibly include the design of a meshing gear that can adapt to slight changes in the gear angle.

- 215 - Can't stop the madness *Ulises Zoe Jasso, Schreiner University; Soledad Diaz, Schreiner University; Diana Laura Aguirre, Schreiner University; Kaitlyn Goertz, Schreiner University*

"Can't Stop" is a dice-based board game that is prime for developing strategy. Because of the lax rules and various ways to obtain a win, the task was discovering many unique and effective techniques to manipulate the board in favor of a win. A variety of strategies using game theory and probability will demonstrate the pros and cons of each.

045-8. Neuroscience Poster Session

Neuroscience
Poster Session
Participants:

- 216 - Roles of TRPA-1 and TRPV-1 channels in learning and memory in *Caenorhabditis elegans* *Vanessa Neutzler, St. Edward's University; Fidelma A. O'Leary, St. Edward's University; He Liu, St. Edward's University*

Transient Receptor Potential channels (TRPs) is a group of cation channels that play a major role in sensory physiology, particularly sensing changes in their local environment. Previous

studies in isolated cells have suggested a molecular interaction between TRPA-1 and TRPV-1 channels, which are responsible for sensing temperature, pain, and osmotic pressure respectively. Using knockout strains of *Caenorhabditis elegans*, the goals of this study were to test multiple functions of TRPV-1 and TRPA-1 on animal behavior and to examine whether TRPA-1 or TRPV-1 are required for learning and memory associated with temperature. Knockout strains lacking either TRPV-1 or TRPA-1 and a wild type strain (N2) were used, all cultivated at 20°C. A thermotactic learning assay was used to test associative learning abilities. Worms were trained in a 15°C incubator for 24 hours with an abundance of food. The data collected showed that TRPA-1 channels are required for associative learning using cooler temperatures. The learning index for TRPA-1 was 5.30±/−2.54, with a total of 592 worms. Comparing this data to the trained wild type data, this showed statistical significance of $p < .001$. The learning index for TRPV-1 was -4.26±/−7.69, with a total of 553 worms. There was a statistical significance of $p < .001$; shows a significance difference against wild type data. However, negative learning index demonstrates that TRPV-1 data was inconclusive; the worms did not learn to associate food with 15°C. TRPA-1 knockouts did not demonstrate associative learning, suggesting that TRPA-1 channels are necessary for associative learning to occur.

- 217 - The effects of segmental regeneration on neural morphallaxis in the aquatic oligochaete, *Lumbriculus variegatus*. Robin C. Sunsong, Univ. of the Incarnate Word; Gicel J. Aguilar, Univ. of the Incarnate Word; Janaye R. Dews, Univ. of the Incarnate Word; Veronica G. Martinez Acosta, Univ. of the Incarnate Word

We have developed a model system, the aquatic oligochaete, *Lumbriculus variegatus*, to address questions of wound healing and regeneration at the cellular and molecular level. *Lumbriculus* is an excellent regenerative model system that replaces lost body parts following amputation by activating two distinct developmental processes: epimorphosis and morphallaxis. Neural morphallaxis involves the transformation of the adult nervous system as regenerating fragments acquire new anterior-posterior neurobehavioral identities in both asexual reproduction and segmental regeneration (Zoran and Martinez, 2009). Previous studies in the lab have demonstrated that morphallactic events are induced following head regeneration (Zoran and Martinez, 2009). To determine if head regeneration is a necessary first step in this regenerative process, we have developed a physical restraining device (glass capillary tube) and a chemical treatment paradigm, which both successfully prevent the regeneration of head segments. In physically restricted fragments, segmental regeneration is severely reduced, with undifferentiated blastemal tissue that extends lengthwise without true segmentation occurring until 10-days post amputation. Similarly, worms treated with the protease inhibitor, AEBSF, contain wound blastemas that did not begin segmentation until 7-days post-amputation. Interestingly, AEBSF treated worms also did not exhibit morphallactic behaviors, which typically occur within the original worm tissue. Specifically, posterior fragments continued to exhibit tail withdrawal or swimming behaviors, suggesting that original worm tissue does not reorganize following treatment with AEBSF. Taken together these experiments strongly suggest head regeneration is necessary for proper functional recovery of the nervous system and that head regeneration must precede morphallaxis.

- 218 - Wolf Spiders Associate Food with Predator Cues in a T-Maze Robert LeBlanc, Sul Ross University

The current study examined sensory cognition of the genus *Pardosa*. Previous researchers have demonstrated predictable *Pardosa* reactions to predator chemical cues in lab settings. Additionally, researchers have also demonstrated other araneae species' ability to associate non-prey visual cues with prey in lab settings via t-mazes. The current experiment combined concepts of the former with strategies of the latter, in that potentially threatening cues were used to train wolf spiders to associate

predator chemical cues with prey in a lab setting. In the current experiment, *Pardosa lapidicina* were exposed to predatory chemical cues in a t-maze design, with a food reward for selecting the potential predatory threat. It was observed that spiders who ate moderately made more accurate decisions at the end of a two week training and testing period.

- 219 - Spontaneous salt intake enhancement occurs even in the absence of hypertonic sodium chloride solution throughout a history of water deprivation. Ashley M Rivera, Wayland Baptist University; J Constancio, São Paulo State University; R C Vendramini, São Paulo State University; Daniela Pereira-Derderian, Wayland Baptist University
- Water deprivation-partial rehydration (WD-PR) protocol is a laboratory methodology used to assess salt appetite. It consists of 36h of WD and 2h of PR. Sodium appetite test (SAT) follows WD-PR and consists of 2h access to 0.3 M NaCl and water. Salt intake sensitization can be induced by repetition of these protocols. We analyzed if salt availability would affect salt intake enhancement induced by a history of water deprivation. Adult male Holtzman rats had access to chow and water ad libitum. Spontaneous intake was measured for 5 weeks. "Aqua S" (n=6-7) was water deprived thrice at 7-day intervals. "Control A" (n=6-7) was WD only once and it was simultaneously to "Aqua S" 3rd episode. Both groups were not exposed to 0.3 M NaCl until the 3rd deprivation. Sodium intake was measured in the 3rd SAT and 5th week only. "Control A" increased ($*p < 0.05$) chow intake in the 5th week compared to the 1st and 4th week (21.9±3.1, 24.1±4.0, 24.2±4.0, 23.1±3.8, 26.2±4.4* g, respectively). In the 3rd week, "Aqua S" ingested more chow ($*p < 0.05$) compared to its 1st week and "Control A" 3rd week (23.1±3.3, 23.1±3.9, 27.5±4.6*, 25.3±4.2, 25.5±4.2 g, respectively). Daily water intake was not affected neither by a history of water deprivation nor by salt availability (36±5, 36±6, 37±6, 37±5, 36±5 mL for "Control A" and 40±6, 36±5, 39±6, 40±6, 37±5 mL for "Aqua S", respectively). In the 1st and 2nd PR, "Aqua S" (21.9±3.1* and 21.8±3.1* mL) ingested more water ($*p < 0.05$) than "Control A" (2.5±0.4 and 1.8±0.3 mL). Water intake during the 3rd PR was similar between groups (21.0±3.0 mL for "Aqua S" and 20.2±2.9 mL for "Control A"). Both groups ingested more water in the 3rd SAT compared to the 1st and 2nd SAT (0.1±0.0, 0.0±0.0, 2.6±0.4 mL for "Aqua S" and 0.5±0.1, 1.2±0.2, 3.6±0.5 for "Control A", respectively). In the 3rd SAT, "Aqua S" (11.3±1.6 mL) ingested more 0.3 M NaCl ($*p < 0.05$) than "Control A" (6.4±0.9 mL). Spontaneous chow intake over 24h following each water deprivation was similar in "Aqua S" (31.3±5.2, 28.3±5.7, 28.6±5.7 g). "Control A" ingested less chow ($*p < 0.05$) after the 2nd episode compared to the 1st and 3rd (28.8±4.8, 24.0±4.8*, 31.0±6.2 g) and "Aqua S" 2nd episode. The unavailability of sodium throughout the repeated episodes of water deprivation episode did not affect daily salt intake enhancement. Thus, the central nervous system might undergo neuroplasticity induced by salt intake sensitization even in the absence of salt.

045-9. Systematics and Evolutionary Biology Poster Session

Systematics & Evolutionary Biology Poster Session

Participants:

- 220 - An Intra-Specific Comparison of *Zygaspis quadrifrons* Grayson H Means, Sam Houston State University; Patrick J Lewis, Sam Houston State University; Cristhian Cadena, Sam Houston State University

The enigmatic and little studied clade Amphisbaenia presents a unique set of challenges to those attempting to study it. This clade, composed primarily of limbless fossorial lizards, has a highly derived cranial morphology. Their derived anatomy, combined with the relative scarcity of specimens to study, has left the phylogeny of the clade uncertain. Species in the genus *Zygaspis* are found in Africa. To more closely examine the morphology of these diminutive reptiles, High Resolution X-Ray Computed Tomography (HRXCT) imaging was used to create

images of four individuals of the species *Zygaspis quadrifrons* captured in southern Africa. HRXCT imaging is an ideal tool to use in the study of this species, as it circumvents many of the issues traditionally associated with studying morphology of diminutive species. Of the specimens, two were male and two were female. This was an attempt to remove any variation presented by the sexual dimorphism of this species. This study focuses on the frontal bones, which are paired elements in *Zygaspis quadrifrons*. Preliminary data shows a general similarity to the previously described *Amphisbaena alba*, but with several noticeable similarities to the *Diplometapon zarudnyi*. However, when performing intra-specific comparisons, a relatively large amount of variation was found in the morphology of the frontals. This variation is likely not due to sexual dimorphism, as males are as varied from each other as they are from females, and vice versa.

221 - Cranial endocast of the amphisbaenian *Zygaspis quadrifrons* Kenneth Nobleza, Sam Houston State University; Cristhian Cadena, Sam Houston State University; Patrick J Lewis, Sam Houston State University

Amphisbaenians are a diverse clade of squamate reptiles. Although the external anatomy and skeleton of amphisbaenians are relatively well described, virtually nothing is known about the anatomy of the brain and its associated nerves and blood vessels. That paucity of knowledge likely is driven by both the difficulty of dissecting such small and fragile specimens, and the reluctance of curators to permit destructive analysis of rare taxa. High Resolution X-ray Computed Tomography (HRXCT) provides a non-destructive method for reconstructing the endocranial space and the pathways of many associated blood vessels and cranial nerves. The goal of this project, therefore, was to use HRXCT imagery to create a three-dimensional cranial endocast of the skull of the African species *Zygaspis quadrifrons*. Several anatomical features clearly are discernible in the digital dataset. For example, the cast of the olfactory bulb is heavily marked by the frontoparietal suture. Posterior to the frontoparietal suture, the cast of the paired optic nerves extend anteriorly. The position of the posterior aspect of the pituitary gland is marked by a V-shaped formation positioned at the midpoint of the cranial endocast in ventral view. A bifurcated cast of the vidian nerve splits into its anterior and posterior branches anterior to the cast of the pons. The cast of the vagus and hypoglossal nerves extend posteriorly at the terminal end of the pons. These new data provide the first high-resolution description of the cranial endocast of this enigmatic taxon.

222 - Phylogeography and the origin of free-ranging elk (*Cervus elaphus*) in Texas Christopher Dale Dunn, Texas Tech University; Matthew R. Mauldin, Texas Tech University; Robert D Bradley, TEXAS TECH UNIVERSITY

The historic range of Elk (*Cervus elaphus*) included much of the western United States. Natural distributions decreased substantially in the twentieth century presumably eliminating the Texas population. In the last 20 years, two herds of free-ranging elk appeared in the Trans-Pecos region of Texas. It is not known if these two herds were the result of introduction from captive herds, or if they represent natural migrants from New Mexico or Colorado. The objective of this study is to determine the origin and genetic affinities of *C. elaphus* in Texas. Hair and ear samples from individuals of these herds will be used to generate genotypes for comparison to wild populations in New Mexico and Colorado. DNA sequences from the mitochondrial Cytochrome-b locus will be used to generate haplotype networks to compare *C. elaphus* samples from Texas with those from New Mexico, and Colorado. In addition, six microsatellite loci have been utilized to examine the phylogeography and genetic divergence of the various aforementioned populations, which will help determine the origin and the relatedness of the *C. elaphus* herds in Texas.

223 - Variation of the Inner Ear of *Zygaspis* (Squamata: Amphisbaenidae) based on High-Resolution X-ray Computed Tomography Justen Deshane Adams, Sam Houston State University; Kenneth Nobleza, Sam Houston State University; Monte Thies, Sam Houston State University; Patrick J Lewis, Sam Houston State University

Amphisbaenians form a clade of truly fossorial lizards composed of 24 genera with 190 species. While situated within the order Squamata, their exact position and systematics remain uncertain. Both their relative scarcity and anatomical adaptations to a fossorial lifestyle contribute to this ambiguity. Examination of their derived anatomy will contribute to resolving taxonomic issues. While many studies focus on the external cranial anatomy, none address variation in the internal cranial anatomy, specifically the inner ear. Usage of high-resolution x-ray computed tomography (HRXCT) allows for reconstruction of structures of the inner ear. An interspecific comparison of inner ear endocasts of *Zygaspis violacea*, *Z. vandami*, *Z. niger*, *Z. quadrifrons*, and *Z. ferox* will allow for a better understanding of the variation between species. Endocasts are internal fillings of hollow spaces that tend to overestimate the exact dimensions of an area, but provide a fairly accurate portrayal of hollow spaces. Members of the genus *Zygaspis* exhibit noticeable variation in the proximity of the semicircular canals to the vestibule as well as differences in width. The vestibule itself differs in both relative size and shape. These findings suggest not only differences in morphology, but differences in auditory perception between species.

Directions to Texas A&M Galveston:

From Houston / I-45

1. Take I-45 South from Houston across the Causeway to Galveston.
 2. Exit 1C: Teichman Road.
 3. Turn left at the stop light onto Harborside, go under the over-pass & continue straight at the second stop light.
 4. Continue ahead through the third stoplight. At the fourth light, at the top of an overpass, turn left at the light (Seawolf Pkwy) & continue across the Causeway to Pelican Island.
 5. The TAMUG/Mitchell Campus- main entrance will be on your right
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From San Luis Pass & on Galveston















1. Take FM 3005; this will become Seawall Blvd.
 2. Turn left at 61st street light. Stay in the right lane.
 3. Merge right onto the ramp toward Broadway/Avenue J. Continue straight through the light on Broadway.
 4. Turn left at 51st street. Keep in mind, there are no left-turn lanes on Broadway.
 5. Go straight through the light at the top of the over-pass. 51st street will become Seawolf Parkway. Continue across the Causeway/lift-bridge onto Pelican Island.
 6. The TAMUG/Mitchell Campus main entrance will be on your right.
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From Port Bolivar/ Ferry Crossing

1. Take Ferry Road to Harborside.
2. Turn right onto Harborside at the light & continue to follow Harborside past the downtown district & cruise terminal.
3. At the top of the overpass, turn right at the light onto Seawolf Parkway / 51st street. [This will be the only overpass you encounter.]
4. Continue across the Causeway/lift bridge onto Pelican Island.
5. The TAMUG/Mitchell Campus main entrance will be on your right.

CAMPUS MAP

Texas A&M University At Galveston

-  Buildings
-  Grass
-  Roadways
-  Gazebo
-  Tennis Court
-  Pool
-  Volley Ball
-  Clock Tower
-  Student Parking
-  Faculty & Staff Parking
-  Motorcycle Parking
-  Residents & Their Guest
-  Visitor & Special Guest Parking
-  Restricted Parking

- 3001 - {KIRK} Kirham Hall
- 3002 - {MART} Marine Transportation
- 3003 - {WFO} Waterfront Operations
- 3004 - {STUC} Mary Moody Student Center
- 3006 - Facilities Services
- 3007 - {CLB} Classroom Lab Bldg
- 3010 - {WILL} Jack K. Williams Library
- 3016 - {SHIP} General Rudder
- 3018 - {GYM} P.E. Facility
- 3019 - Sewage Plant
- 3025 - {Student Support} Police
- 3026 - {SAGC} Sea Aggie Center
- 3027 - {PMEC} Powell Marine Engineering Complex
- 3028 - {RLC} Residence Life Center
- 3029 - {OCSB} Ocean & Coastal Studies Bldg
- 3030 - {SSSC} Seibel Center
- 3104 - {WTLC} Wetlands Center
- ...Residence Halls...
- 3005A - Hullabaloo Hall
- 3005B - Oceans Hall
- 3009C - Mariner Hall / Academic Enhancement
- 3031 - Pacific Hall
- 3032 - Atlantic Hall
- BldgD - Polaris Hall
- BldgE - Albatross Hall

