116th Annual Meeting of the Texas Academy of Science

February 28 - March 2, 2013

Schreiner University

Kerrville, Texas

Drawing above is the cover art from the Annual Meeting program for the 2004 Annual Meeting, also held at Schreiner.
Artist: Rob Fleming, Texas Parks and Wildlife Department

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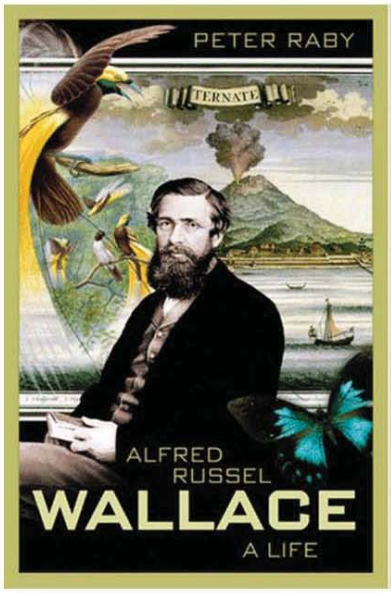
UPCOMING MEETINGS

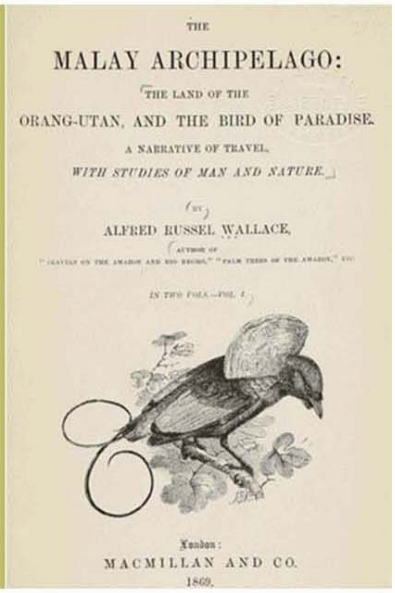
2014 Texas A&M University, Galveston

2015 University of the Incarnate Word, San Antonio

...It was you that broke the new wood,
Now is a time for carving.
We have one sap and one root
Let there be commerce between us.

From 'A Pact' by Ezra Pound (1913)





The Texas Academy of Science takes this opportunity to celebrate the life and works of one of the titans of 19th century science, Alfred Russel Wallace who passed away 100 years ago this November. Best known with Charles Darwin for co-authoring the concept of natural selection, Wallace was an intrepid explorer who spent most of his life discovering and interpreting evidences to support his broader vision of evolutionary change. His works describing geographical patterns of plants and animals not only led to his being recognized as the 'Father of Biogeography' but also helped usher in the modern evolutionary synthesis. Ernst Mayer called his approach 'geographical evolutionism' in that it emphasized the spatial relationships of closely related species. His hypothesis of reinforcement, or the 'Wallace Effect' offered a mechanism for reproductive isolation, a critical step in what would only later be known as 'speciation'. A creative, productive and prescient mind he helped pioneer the study of biological mimicry with his life-long friend Henry Bates, and wrote on a broad variety of other scientific subjects including epidemiology, geology, ethnography and astrobiology. His sensitivities and energies extended to environmental and social justice and he was a strong advocate against deforestation, soil erosion, land monopolies and unfair labor practices.

His accomplishments are even more impressive when we consider that family monetary problems forced him out of grammar school and he apprenticed as a surveyor with his older brother. Spending most of his time outdoors fortunately triggered within him a passion for nature. He then began his systematic habits of studying and collecting; first, the plants and later the insects and other animals that surrounded him. Wallace also took inspiration from readings of other naturalists, and Darwin's and Humboldt's travelogues set aflame his plans to also travel the world. He would not be a vagabond, however and two key characteristics of his personality that structured his life, initiative and focus came to the fore. Before leaving England, he read the popular but controversial 'Vestiges of the Natural History of Creation' an anonymously written text that suggested that everything in existence, inanimate and animate arose by change from pre-existing forms. This was an idea that gave reason to his future travels and he vowed he would solve the central mystery of where species came from. It was helpful after he embarked to the Amazon with Bates, on the first of many adventures, that he had also read Malthus' treatise on populations.

Wallace's contributions to science are often forgotten or minimized in the long, brilliant shadow cast by the like-minded Charles Darwin. This is a very unfortunate writing of history, however and we should appreciate separately and yet together their many intellectual gifts. In a biological analogy, their relationship was a true mutual symbiosis, with both available to the other to help guarantee the survival of their idea of evolution. Indeed, theirs is one of the most honorable stories in the history of science. In this well documented narrative, we have two brilliant students of nature, who shared the distinction of separately arriving at the core paradigm of natural selection. Upon finding they had reached the same inestimable theoretical marker, they joined hands and then their voices in articulation of their common creation. This story could have turned out horribly with individuals of less character and even less understanding of the scope of their idea. Their cooperation set a standard that is both enviable and yet necessary. Their mutual respect kept the theory of natural selection from being trivialized as being only about 'red in tooth and claw' but symbolized its much deeper and fundamental interpretations. Let us help celebrate this centenary year of Alfred Russel Wallace by honoring his choice, and making it our own, to nurture principled scientific ideas so that they may thrive and grow.

SCHEDULE OF EVENTS

Thursday, February 28		
2:00 pm – 5:00 pm	TAS Board of Directors meeting	Weston Place
2:00 pm – 6:00 pm	Art exhibit set-up	Cailloux
4:00 pm – 7:00 pm	Conference Check-In/Late Registration	Cailloux
6:00 pm – 8:00 pm	Welcome Mixer	Cailloux
7:00 pm – 9:00 pm	*How to Find Your Dream Sciences Job* (presenter Joe Beach)	Cailloux 2nd floor
7:00 pm – 7:30 pm	Film showing: *Confluence: Big Bend Reach of the Rio Grande* (presenter Kevin Urbancyk)	Cailloux theater (1st floor)
7:00 pm – 8:00 pm	*NMR in a "Shoebox"* (presenter Jeffrey W. Sherman)	Moody 106
7:30 pm – 8:30 pm	*How Connected Do Scientists Need To Be?* (facilitator Romi Burks)	Cailloux 2nd floor
Friday, March 1		
7:30 am – 11:30 am	Conference Check-In/Late Registration	Cailloux
7:30 am – 9:00 am	Breakfast/Morning Refreshments	Cailloux
8:15 am – 12:00 pm	Science Education Symposium	Weir 006
8:30 am – 7:00 pm	Vendor Displays	Cailloux, River Room & Schreiner Recliner
8:30 am – 7:00 pm	*Art from the Republic of Science* exhibit	Cailloux
8:30 am – 5:00 pm	Poster Sessions	Cailloux, River Room & Schreiner Recliner
8:30 am – 9:45 am	Paper Sessions/Presentations	Weir Academic Building Moody Science Building
9:45 am – 10:00 am	Mid-Morning Break	Weir, Moody
10:00 am – 12:00 pm	Paper Sessions/Presentations	Weir, Moody
11:30 am – 12:15 pm	Poster Judging for these sections only: Biomed., Chem./Biochem., Cell & Molecular, and Env. Sci.	
11:30 am – 1:00 pm	Lunch and Business Meeting	Cailloux 2nd floor
12:15 pm – 1:00 pm	Poster Judging for these sections only: Anthro., Bot., Comp. Sci., Cons. Ecol., Freshwater, Geo., Marine., Math, Neuro., Physics, Sci. Ed., System., Terr. Ecol.	
1:00 pm – 2:30 pm	Paper Sessions/Presentations	Weir, Moody
1:00 pm – 2:30 pm	*The Agricultural Enterprise and Research that Protects Humans, Animal Health and Food Security* symposium	Moody 106
2:30 pm – 3:00 pm	Mid-Afternoon Break	Weir, Moody
3:00 pm – 4:00 pm	Paper Sessions/Presentations	Weir, Moody
4:00 pm – 5:00 pm	DTS and OTE	Dietert Auditorium
5:00 pm – 5:30 pm	DTS and OTE Q&A session for students	Dietert Auditorium
5:15 pm – 5:45 pm	All Section Chairs Meeting	Moody 106
6:00 pm – 7:00 pm	Banquet Reception	Cailloux 2nd floor
7:00 pm – 9:00 pm	Awards Banquet	Cailloux 2nd floor
Saturday, March 2		
8:00 am – 10:00 am	Art exhibit take-down	Cailloux
	Various Field Trips	sign up at registration

ACKNOWLEDGEMENTS FROM THE PROGRAM CHAIR

Thank you for your presence here in Kerrville in 2013. We have a busy meeting full of oral presentations and posters, thanks to students and senior members eager to talk about their work and learn from others. This meeting could not happen without each one of you in attendance and fully engaged, so thank you

I would like to extend my deep gratitude to the Harte Institute for Gulf of Mexico Studies, and its Executive Director, Larry McKinney, former President of the Academy. The Harte Institute provided a generous gift toward student awards at the 2013 meeting.

It takes a lot of work to put on a scientific meeting of this caliber, and I did not have to do it alone! Pati Milligan with Baylor University configured the abstract submittal and review system, and compiled this excellent program – thank you Pati for the 2013 program and thank you for your years of service as the first-ever Coordinator of Information Technology for the Academy. I wish you a happy, well-deserved retirement!

I tip my hat to the Section Chairs – what a great group to work with! Every Program Chair knows that there would be no meeting without the Section Chairs. I hope many participants of the meeting take the opportunity to thank the leaders in your sections for reviewing and editing the abstracts that were submitted, and moderating the oral presentation sessions.

I was very fortunate to have Fred Stevens as the local host for the meeting I had to plan. Fred is highly knowledgeable about the Academy from his years on the board, and was Local Host when the meeting was held at Schreiner nine years ago! I knew the meeting would be in good hands. Thanks to all the Schreiner folks Fred mentions in his acknowledgements, and a special thanks to Dr. Summerlin, for his hospitality and welcome to the Board in October, and again at the Annual Meeting.

Finally I want to thank Robin Riechers, Coastal Fisheries Division Director at Texas Parks and Wildlife Department, for his support of my leadership role in the Academy. Along those lines, I must also thank Water Resources Branch Chief Cindy Loeffler and Water Quality Program Leader Patricia Radloff, for supporting and facilitating my work in the Academy. Marsha May, Corresponding Secretary of the Academy, is another TPWD colleague who assisted enormously in planning this meeting by coordinating field trips, updating the web site, acquiring awards, and much more. I would be remiss not to thank Margaret Scarborough with Water Resources Branch, who has supported my efforts at the Academy for many years and made many things possible for this meeting.

ACKNOWLEDGEMENTS FROM THE LOCAL HOST

The efforts of many individuals and groups are essential to a successful conference. Preparations for the 2013 annual conference of the Texas Academy of Science began about 3 years before the meeting. The Kerrville Convention and Visitors Bureau provided essential help in planning the meeting and provided critical support for Check in and Registration. The administration of Schreiner University early on committed to supporting the meeting. Special thanks to Dr. Charles McCormick VP of Academic Affairs for agreeing to lend Schreiner University support to the conference. Thanks to the Registrar, Darlene Bannister, for incorporating the annual meeting into the Schreiner University academic schedule for the spring term 2013.

The Schreiner University chapter of the Texas Academy of Science enthusiastically embraced the chance to host the annual meeting. Special thanks to Colby Adolph, Danny Hicks, and to Roy Espinosa for the t-shirt design.

A number of groups of staff on the Schreiner campus were especially important for the support of this meeting. These include the maintenance staff, the IT professionals especially Dan Brown, Kathy Walker, and Kent Smith, the Sodexo staff especially Jamie Pouch and Martino Ortega, and Tammy Clanton for her effective coordination of use of the Cailloux Center.

The local host committee included Kiley Miller, Robert Holloway, Chris Distel, Lesa Presley, Diana Comuzzie, Carolyn Pyeatt, Corrina Fox, and Danette Vines. I feel especially privileged to work with such a supportive group of scientist educators.

I also need to recognize the staff of the Dean of Science and Math's office, especially Paula Repka. Paula coordinated the assignments of her work study students to make sure that arrangements for the annual meeting were completed in an effective and timely manner. Paula also donated her valuable time and energy to preparation for the meeting.

Last, thanks must go to my wife Patricia Chastain. Her continuous support behind the scenes for this conference has been both vital and substantive.

THANK YOU VENDORS!

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LETTER OF WELCOME FROM THE TAS PRESIDENT

Welcome to the 115th Annual Meeting of the Texas Academy of Science at Schreiner University in Kerrville, Texas. The last time the TAS meeting was held at Schreiner University (2004), I was still a graduate student hoping to make professional contacts at the meeting that would help me land a full time position in the near future. The changes that have taken place in the Academy since then have been at times rewarding, challenging, and sad. Since I joined TAS and attended my first meeting as an undergraduate in the 90's, our membership and attendance at meetings has steadily grown. Advances in technology have helped us run our organization more efficiently and increase our visibility in the state of Texas. And sadly, we have also lost some of our leaders, most recently David Marsh and Deborah Hettinger. David was making a huge contribution to student members for years before I was even in a position to appreciate his efforts. I first met him when I was a section chair and I needed to pick up the judging forms and certificates for my section. When I was a graduate student, Deborah was one of the first people to reach out to me and encourage me to be involved with TAS as a professional, not just as a student. I am forever in her debt for her support.

Writing this letter of welcome was a special challenge for me. I wanted it to be positive and encouraging, but I could not completely bury my sadness at our loss of both David and Deborah this past year. I turned to my collection of old meeting programs for inspiration. Many of the welcome letters spoke of challenges met and overcome, or gave examples of progress made in the past year. All encouraged or challenged the membership to get involved, to strive to help the Academy continue to improve. I like the 2005 letter by John A. Ward the best. He said that at the banquet, he would pass the torch to the President Elect, Damon Waitt, and that next year it would go to then Vice President, David Marsh. Then he said, **'Eventually one of you will take it.'** John went on to challenge everyone to go a little further in the Academy next year than they had in the past year, 'If you haven't presented this year, present next year....If you've been a section chair, seek nomination to the Board of Directors....**You are the future of this Academy.'** Here I found the message I want to leave with our current membership: Who inspired you at your first meeting or after your first presentation? Who supported you in your first term as section chair? Appreciate what yesterday's leaders of the Academy have built for us. Nurture what today's leaders have improved upon. **Then, step up, volunteer, become tomorrow's leaders and continue their legacy!** The Academy and all its future members will thank you!

Cathleen N. Early
President

City of Kerrville
701 MAIN STREET • KERRVILLE, TEXAS 78028 • 830.257.8000 • KERRVILLETX.GOV

Jack Pratt, Jr.
Mayor

Dear Texas Academy of Science Attendees:

On behalf of the Citizens of Kerrville, Texas, we cordially welcome you to our City situated in the most beautiful heart of the Texas Hill Country with the flowing Guadalupe River, and to express our support of your 116th meeting of the Texas Academy of Science.

We are proud of our Kerrville heritage, its beauty, tranquility, business environment, quality of life, our three wonderful golf courses, our employees, our schools, college and university. Kerrville is known for its clean air, pristine water, warm friendly southern hospitality, three wonderful medical facilities, diversity of entertainment, our river trail, wildlife with wide open spaces, and is regarded not only as the best place to retire but also as a tremendous place to work and raise a family.

We are glad to have you with us in Kerrville over the next several days and know that you will also find our community to be warm and welcoming. We are humbled to host you and approximately 500 of your peers representing more than 40 colleges and universities.

You have a wonderful program mapped out for you so have a great meeting, with in depth thought provoking discussions, and take this opportunity to network among all participants to learn from each other. On behalf of the City of Kerrville, we wish you the best of success and hope that you find this year's meeting very rewarding.

Sincerely,

Schreiner University
LEARNING BY HEART℠

OFFICE OF THE PRESIDENT
2100 MEMORIAL BOULEVARD
KERRVILLE, TEXAS 78028-5697
830.792.7345

December 3, 2012

To members of the Texas Academy of Science:

I was pleased to learn that after eight years of meeting at sites around the state, the Texas Academy of Science will return to the Schreiner University campus next spring. If my math is correct, this will mark the 116th TAS conference, and, as president of Schreiner, I am pleased that we are able to host this event.

We are aware of the great national need for professionals in the STEM areas and just as aware of the challenges posed by continuing economic stagnation to scientific education and inquiry. If there were ever a time for a strong group advocating for the sciences and committed to scientific study, that time is now. I salute all of you who express your commitment to those values by your participation in TAS activities.

One of the strengths of the academy is its breadth of membership. Bringing faculty in colleges and universities, public and private, together with representatives of state agencies and research organizations makes for a stronger voice. I trust that you will find your time at the annual conference affords you the opportunity to enhance your awareness of what others are accomplishing around our state and to strengthen your communication network.

We at Schreiner have certainly found TAS to provide an excellent venue for our faculty to grow and for our students to participate in a stimulating professional setting. Having added a program in field biology and a BSN major since the last TAS meeting on our campus, we are committed to helping address the need for scientific professionals in diverse fields.

May your meeting be fruitful and your organization strong.

Sincerely,

Tim Summerlin
President

2013 DISTINGUISHED TEXAS SCIENTIST

Camille Parmesan

Professor, Integrative Biology, University of Texas at Austin
and National Aquarium Chair in the Public Understanding of Oceans and Human Health,
Plymouth University, UK

Dr. Camille Parmesan's research focuses on the current impacts of climate change on wildlife, from field-based work on American and European butterflies to synthetic analyses of global impacts on a broad range of species across terrestrial and marine biomes. This work has had high impact, leading to Parmesan being ranked the second most highly cited author in the field of Climate Change in 2010 by Thomas Reuters Web of Science. Her analyses documenting the global extent and pervasiveness of the effects of anthropogenic climate change ob biodiversity have helped support arguments in policy sectors for reduction of greenhouse gas emissions. She works actively with governmental agencies and NGOs to help develop conservation assessment and planning tools aimed at preserving biodiversity in the face of climate change. She was awarded the Conservation Achievement Award in Science by the National Wildlife Federation, named "Outstanding Woman Working on Climate Change," by IUCN, and named as a "Who's Who of Women and the Environment" by the United Nations Environment Program (UNEP). Parmesan has worked with the Intergovernmental Panel on Climate Change for more than 15 years, and shares in the Nobel Peace Prize awarded to IPCC in 2007. Dr. Parmesan is a Professor in Integrative Biology at the University of Texas at Austin (USA) and holds the National Aquarium Chair in the Public Understanding of Oceans and Human Health in the Marine Institute, Plymouth University (UK).

2013 OUTSTANDING TEXAS EDUCATOR

KENT PAGE

Kent Page was born in Amarillo, the first of three children. His father was a master carpenter, and his mother spent most of her time as a homemaker and volunteer at their small church. His father was an intelligent and kindly man despite formal education that did not extend past elementary school, and he steered Kent toward education that would open doors of opportunity he had never known. Kent began piano lessons when his musical interests were recognized. Later the competition for time between sports and music was decisively concluded after a season-ending knee injury during a football game. Kent was recruited to play the piano for his high school choir and subsequently offered a scholarship to accompany the West Texas A&M University Choir at Canyon. After graduation Kent began the truly creative endeavor of making a living with a music degree. He and his wife Linda earned their academic credentials in an alternating pattern. She began work on her master of psychology degree as he took up teaching. The birth of their children highlighted the need for a job with health benefits. Therefore, he completed his second master's degree in education, earned a teaching certificate, and began working in the public school system. He became a teacher at a special school for severely emotionally disturbed children who were physically aggressive. While there, he learned it was imperative to keep these students positively engaged in the lesson. He devised and implemented many of the concepts that drew him into his third master's degree with an emphasis in science. He was guided by what was most effective for his students. Although he has shifted from private to public schools, from music to science, and from student population from private instruction, to special education, to a Title I elementary public elementary school; his experiences as a musician, teacher, and business owner have all contributed to his teaching toolbox. His current position as the science teacher at Carnahan Elementary School in San Antonio's Northside ISD continues to challenge as new opportunities for shaping the future arise.

2013 FELLOW OF THE ACADEMY

MARSHA MAY

Marsha May earned a B.S. in Wildlife Sciences from Texas A&M University and a M. S. in Aquatic Biology from Southwest Texas State University (now Texas State University) in San Marcos. She currently works at Texas Parks and Wildlife Department in Austin as the coordinator of the Texas Nature Tracker Program, where she teaches workshops on monitoring populations of freshwater mussels, amphibians, whooping cranes and more. She is also heading up the Biological Inventory Team project at TPWD, gathering local experts of herps, invertebrates, birds and plants throughout Texas into teams available to conduct inventories for these species on private property with the goal of contributing valuable data to the TPWD Texas Natural Diversity Database. She also teaches general biology as a part-time instructor at the Taylor Campus for Temple College.

Her first experience with the Texas Academy of Science was in graduate school where she presented her graduate project in 2001 and has continued to be an active member. In 2010, she was elected to the Texas Academy of Science Board as a Non-Academic Director and was appointed in 2011 as Corresponding Secretary, where she continues to serve.

2013 FELLOW OF THE ACADEMY

KILEY MILLER

Kiley Miller was born and raised in west Texas. He obtained his B.S. in chemistry from Schreiner University in Kerrville. He obtained a M.S. in analytical chemistry from the University of Texas in Austin. He subsequently earned his Ph.D. in bioengineering from the Massachusetts Institute of Technology in Cambridge before entering the personal care industry. He did a short stint at Colgate-Palmolive Company, where he worked as a product developer in the oral care division.

In 2006, he returned to Kerrville and joined the faculty of Schreiner University. He is currently an Associate Professor of Chemistry at Schreiner's Trull School of Science and Mathematics and is also the Department of Sciences Chair.

2013 FELLOW OF THE ACADEMY

DANETTE VINES

Danette Rene Vines obtained her Ph.D. in Organic Chemistry at Iowa State University having completed her B.S. at McNeese State University. After 10 years working as an industrial research scientist in the chemical/pharmaceutical industry, she decided to pursue her teaching career. She currently serves as Associate Professor at Schreiner University. Her specialties include oversight of a small undergraduate research group, teaching organic and general chemistry, and advanced topics in chemistry. During her teaching career she has received the Pinnacle Excellence Award in teaching (2008), the Elmore Whitehurst Award for Creativity in teaching (2011), and the Margaret Hossler Award for Excellence in teaching (2012). Throughout her career, she has patented, published and presented on industrial and pharmaceutical science, and, most importantly, she has been actively involved in undergraduate research. She is a member of TAS where she serves as the current chairperson for the Chemistry and Biochemistry section, and she is a long-standing member of the American Chemical Society.

IN MEMORIAM

DEBORAH HETTINGER

Deborah Hettinger, a professor beloved by a generation of students at Texas Lutheran University, died on Wednesday, October 17, 2012, in Seguin, Texas. Deborah was a Fellow of the Texas Academy of Science and served on the Board of Directors as Corresponding Secretary for almost ten years. Stephen's College in Columbia, Missouri, was Deborah's choice for her undergraduate education. She went on to earn a Ph.D. in Physiology from the University of California at Davis, then took a post-doctoral position in San Antonio at the U.T. Health Science Center. In 1980 she joined the faculty of Texas Lutheran University (TLU) in the Biology Department. Her teaching skills were a strong influence on many of her students who went on to become researchers and health care providers. She was proud of the achievements of all of her students, and many of them kept in touch and came back to visit with and thank "Dr. H" for the positive influence she had on their lives. As a member of the TLU Health Professions Committee, she wrote innumerable letters of recommendation, arranged internships for students, conducted mock interviews to prepare students for their medical school interviews, and generally mentored the students with interest in health professions and biological research careers. Deborah is survived by her husband, fellow TAS member Dr. John T. Sieben.

IN MEMORIAM

DAVID MARSH

David Marsh, former President of Texas Academy of Science and professor at Angelo State University, died on June 25, 2012, in San Angelo, Texas. He received his B.S. from Duke University and Ph.D. from the University of Texas at Austin. At Angelo State University, he served for 29 years in the Biology Department. He always believed it was a privilege to serve students and particularly enjoyed working with them on the Health Professions Advisory Committee and his sensory physiology research. His greatest reward was when his students went on to achieve greatness. To his credit, nearly all of his research students earned M.D.'s and Ph.D.s. He was very active in the Texas Academy of Science, a Fellow of the Academy, and respected throughout the state for his many leadership roles in TAS. He was a dedicated teacher and researcher who cared a great deal about students. Here are some of the things said about Dave in his obituary: "He was famous for saying what students needed to hear, instead of what they wanted to hear. He was always willing to help others. He was a man who could accomplish anything he set his mind to."

2012 – 2013 Texas Academy of Science Board of Directors

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Workshops are all Thursday evening
Field Trips are all on Saturday
(Advanced Registration by February 25 Appreciated)

Workshops - Thursday

How to Find Your Dream Sciences Job

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 Government Applications as well as craft a résumé 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

We look forward to seeing you all there
Advanced Registration - Contact Marsha May at marsha.may@tpwd.state.tx.us or 512-389-8062

How "Connected" Do Scientists Need to Be:

Your facilitator will be Romi Burks, Past President of the Texas Academy and Associate Professor of Biology at Southwestern University.
Romi is an aquatic ecologist interested in science communication. During the workshop, we will:

- Review the options of how people connect: Facebook, Twitter, Webpages, Blog, Press Releases,
- Discuss attendees' opinions as the responsibilities to "engage" in Social Media
- Talk about the advantages of getting your "science" out there: Crowdfunding - SciFund Challenge, Petridish.org
- Develop a list of strategies to start small and grow - consultants such as Art.Science.Gallery.com
- and more...

Advanced Registration - Contact Romi L. Burks, Ph.D., Associate Professor of Biology, Southwestern University, Office Phone: 512-863-1280, email: burksr@southwestern.edu

Field Trips – Saturday

Kerr Wildlife Management Area

Saturday morning at 9:30AM
Meet at the Kerr Wildlife Management Area

There will be an ecosystems program indoors, then head out to the field for a few stops and wrap up the program at the deer research facility.

The Kerr Wildlife Management Area (KWMA) is located at the headwaters of the North Fork of the Guadalupe River, 12 miles northwest of Hunt, on FM 1340. The Area contains 6,493 acres and was purchased in fee title by the State of Texas (Game, Fish and Oyster Commission) in 1950 from the Presbyterian MO Ranch Assembly. It is operated as a research and demonstration area in the Edward's Plateau Ecological Region by the Texas Parks and Wildlife Department.

The KWMA was selected as a land base for the Edwards Plateau Ecological Region to develop and manage wildlife habitats and populations of indigenous wildlife species, provide a site where research of wildlife populations and habitat can be conducted under controlled conditions, and to provide public hunting and appreciative use of wildlife in a manner compatible with the resource. The Area's primary mission is to function as a wildlife management, research and demonstration site for trained personnel to conduct wildlife related studies and provide resultant information to resource managers, landowners and other interested groups or individuals to acquaint them with proven practices in wildlife habitat management.

Must have 25 or more participants for this field trip to make, so registration required.

Advanced Registration and directions - Contact Marsha May at marsha.may@tpwd.state.tx.us or 512-389-8062

Texas Biomedical Research Institute

9:00 AM
Meet at the Cailloux Campus Activity Center parking lot, then caravan to Texas Biomed in your own vehicle.

There will be a tour of the animal facilities and research labs.

Texas Biomed's Southwest National Primate Research Center has contributed to life-saving treatments and new approaches to diseases, including a vaccine for hepatitis B virus and a ventilator that rescued infants from pulmonary distress. The center also has helped to identify genes that influence the onset and severity of many illnesses.

The AT&T Genomics Computing Center houses the world's largest number of processors devoted to human genetic and genomic research. Once a gene for a given disease is identified, targets can be developed to try new treatments for the disease. The 8,000 computer processors are used by more than 200 researchers at over 90 institutions worldwide.

Advanced Registration - Contact Diana Comuzzie at comuzzie@schreiner.edu to reserve your spot

Field Trips – Saturday

Geology Field Trip
Petrology, Stratigraphy and Structure of the SW Llano Uplift, Texas
Leaders: LaRell Nielson and Chris Barker; Stephen F. Austin State University,Department of Geology

With several interesting stops along the southwest margin of the beautiful Llano Uplift, this trip has something for everyone. We will look at:

- An unusual low-quartz Precambrian granite with Cretaceous limestone on the other side of the road (how did that happen?);
- Brick-red Cambrian Sauk sequence Hickory Sandstone that contains cross-beds, ripple marks and mud cracks;
- Gypsum deposits from the restricted Cretaceous Kirschberg lagoon;
- A textbook nonconformity with Cambrian sandstone overlying Proterozoic granite;
- Spectacular chevron and s-type folds in foliation of the Packsaddle schist;
- And rare Cambrian stromatolites—examples of the first types of wave-resistant bioherms.

The trip leaves Kerrville early Saturday morning and makes the short drive north to the Llano Uplift. It will end with a late lunch at Cooper's Bar-B-Que in historic Mason, TX.

Advanced Registration - Please contact Chris A. Barker, PhD, PG
Associate Professor and Field Camp Director, Dept. of Geology, Stephen F. Austin State University at (936) 468-2340 or email: cbarker@sfasu.edu

If you do not register by February 25, a registration sign-in sheet will be available for Workshops and Field Trips at the registration table

116th Annual Meeting of the Texas Academy of Science Symposium

The Agricultural Enterprise and Research that Protects Humans, Animal Health, and Food Security

Friday, March 1, 2013 Moody 106

1:00 pm – 2:30 pm

1:05 pm: – "APHIS-VS and One Health in Texas"

Kevin Varner, DVM, Area Veterinarian-In-Charge for Texas
USDA, Animal and Plant Health Inspection Service - Veterinary Services (http://www.aphis.usda.gov/animal_health/area_offices/states/texas_info.html).

One Health is the concept that the health of animals, the health of people, and the viability of ecosystems are inextricably linked. The importance of this concept is increasing as the expansion of human and animal populations, ecological changes due to human impact and climate variations, and technological advancements facilitating global human, animal, and product movements have resulted in an increased risk of disease transmission between animals and people. This presentation will describe the vision, mission and goals of the One Health Office established by APHIS - VS.

1:26 pm – "Texas Animal Health Commission Contributions to the Prosperity of Texans and the U.S."

Dee Ellis, DVM MPA, Executive Director/State Veterinarian, Texas Animal Health Commission (http://www.tahc.state.tx.us/). The **Texas Animal Health Commission** (TAHC), one of the oldest state regulatory agencies, was founded in 1893 by the legislature with a mission to combat the fever tick that plagued the Texas cattle industry. Agency programs to protect the health and enhance the marketability of all Texas livestock, exotic livestock and poultry, including: cattle, swine, poultry, sheep & goats, equine, exotic fowl, and exotic livestock will be described.

1:47 pm – "Agricultural Enterprise & Research that Protects Humans, Animal Health, & Food Security"

Adalberto Pérez de León, DVM, MS, PhD, Director & Research Leader, USDA-ARS Knipling-Bushland U.S. Livestock Insects Research Laboratory (http://www.ars.usda.gov)

KBUSLIRL is the site of diverse programs including research to develop methods for the control of ticks of medical and veterinary importance, the control of blood-feeding flies affecting cattle and support for the international Eradication Program Against Screwworms. This presentation will document how these efforts support the mission of USDA ARS's National Program on Veterinary, Medical, and Urban Entomology to develop more effective means to eliminate or suppress insects and ticks that harm agricultural animals and humans.

2:08 pm – "USDA Future Scientist Program: To Infinity & Beyond Learning with Bugs in Classroom"

Craig Wilson, Ph.D., Director of the USDA, Hispanic Serving Institutions (HSI) National Future Scientists Program, Texas A&M University (http://www.hsi.usda.gov/CornEarWorm). **USDA/HSI National Future Scientists Program** helps teachers become more effective, increases student engagement in science, and improves their scientific knowledge and skills. The Future Scientists Program assists USDA/ARS in reaching out to communities and schools with hands-on, inquiry-based activities that link them with USDA/ARS scientists, laboratory sites, and current agricultural science research, the program addresses National Science Education Standards by emphasizing cutting edge research and scientific processes using appropriate technologies. Activities helping achieve the program's goal to develop student potential, encourage their pursuit of science courses in college, and enter the science career pipeline as "Future Scientists" will be presented during this talk.

2013 Program Chair

Cindy Hobson

Program Editor

Pati Milligan, PhD

2012 Program Agenda

Codes indicate the following:

U Undergraduate (Collegiate) student Academy member

G Graduate student (Collegiate) Academy member

NS Non Student (Senior) Academy member

DISCLAIMER

Despite efforts of the editors, some errors and misspellings may be found in the program. Every attempt was made to correct obvious errors.

Anthropology Section - Moody 208

Oral Presentations

8:30 AM	G	312	A Late to terminal classic household in the shadows of the ancestors: A View from Group E, Xunantunich Catherine Sword, University of Texas at San Antonio
8:45 AM	NS	387	New evidence for the introduction of domestic stock in Southern Africa Britt Bousman (Anthropology, Texas State University), Raymond Mauldin (Center for Archaeological Research, UTSA), Karin Scott (Pretoria, South Africa) and Garth Sampson (Anthropology, Texas State University)
9:00 AM	NS	392	Bunny tales: Using stable isotopes from short-lived leporids to reconstruct local paleovegetation at archaeological sites. Raymond Mauldin*, Cynthia Munoz, Robert Hard, Stephen Smith, University of Texas at San Antonio, San Antonio, Tx. and Steven Lukefahr, Texas A&M University, Kingsville, Tx.
9:15 AM	NS	406	Examining the case for wattle and daub prehistoric structures on the San Antonio River, Bexar County, Texas Stephen Smith and Steve Tomka-University of Texas at San Antonio, San Antonio Texas
9:30 AM	G	453	Analysis of the lithic debitage from the older-than-Clovis stratigraphic levels of the Gault Site, Texas

Jennifer Gandy, Texas State University, San Marcos TX

9:45 AM **Morning Break**

10:15 AM G 468 Ecogeographic patterning and upper respiratory function of the maxillary sinus among modern humans (*Homo sapiens*)
Lauren N. Butaric, Texas A&M University, College Station, TX

10:30 AM NS 486 A stable isotope analysis of hunter-gatherers from Hitzfelder Cave, Texas
Cynthia Munoz*, Jennifer L. Z. Rice, Kirsten Verostick, Robert Hard, and Raymond Mauldin- University of Texas at San Antonio, San Antonio, Tx.

10:45 AM G 521 The Daka calvaria and implications for *Homo erectus* taxonomy
Keely B. Carlson* and Bonny M. Christy, Department of Anthropology, Texas A&M University, College Station, TX

11:00 AM G 527 Activity-related changes to the patella among Native American groups
Maggie McClain, Texas State University-San Marcos

11:15 AM G 545 A survey of the frequency of supernumerary teeth in non-human hominids
Timothy L. Campbell, Department of Anthropology, Texas A&M University

11:30 AM **Anthropology Section Meeting**

Anthropology Poster Presentations

NS P493 A dental anomaly in a Pre-Inca population of Ecuador
Jennifer Zonker Rice, Center for Archaeological Research, The University of Texas at San Antonio

G P444 A forgotten home: Unraveling the history of the McAdoo plantation through archaeological and historical investigations.
Heather Fischer, Krystle Kelley, David Hacker, Elizabeth Martinez Texas Tech University

G P614 Ceramic Petrofacies: Modeling the Angelina River Basin in East Texas
Robert Z. Selden Jr.; Department of Anthropology, Texas A&M University and Center for Regional Heritage Research, Stephen F. Austin State University

U P399 Digging hippie archaeology in the Lone Star State
William D. Cawley*, Tamra L. Walter, and Jacob R. Edwards, Texas Tech University , Lubbock, TX

G P612 Epistemology and synthesis: Instrumental neutron activation analysis and the Caddo tradition
Robert Z. Selden Jr., Department of Anthropology, Texas A&M University and Center for Regional Heritage Research, Stephen F. Austin State University

G P341 The Archaeology of Peaceable Kingdom Farm, Washington County, Texas
Rhiana D. Casias*, Kennedy Huckobey, Maci Gregg, Kelsey Androit, Texas Tech University, Lubbock, TX

G P613 The East Texas Caddo: Modeling tempo and place
Robert Z. Selden Jr.; Department of Anthropology, Texas A&M University and Center for Regional Heritage Research, Stephen F. Austin State University; Timothy K. Perttula; Archeological and Environmental Consultants, LLC

G P432 Within reach: The excavation of water wells
Jacob Edwards, Texas Tech University, Lubbock, TX

Biomedical Section - Moody 203

Oral Presentations

8:30 AM U 330 MIF deficiency enhances the efficacy of gucocorticoid treatment in experimental autoimmune myocarditis and ameliorates the progression to dilated cardiomyopathy

*Braxton Jamison, Rebecca A. Sosa, Thomas G. Forsthuber

8:45 AM U 422 Temporal relationships in the progression of oxidative stress, amyloid-β accumulation, and cognitive dysfunction in the CL2355 *C. elegans* Alzheimer's disease model

Travis Peery*, Matthew Lagarde, and Fidelma O'Leary, St. Edward's University, Austin, TX

9:00 AM G 470 Biochemical and molecular identification of coagulase-negative *Staphylococcus s*pecies from university athletes.

Juan Albert Celedon* and Jean M. Escudero, Texas A&M University of Kingsville, Kingsville, TX 78363

9:15 AM U 559 An *in silico* study of transforming growth factor-β1 induced collagen-I expression in human periodontal ligament

Elizabeth A. Perry*, Richard G. LeBaron, George Perry, Clyde F. Phelix, University of Texas at San Antonio, San Antonio, TX

9:30 AM U 566 Validation of methionine aminopeptidase 1 as a potential chemotherapeutic target for trypanosomatids

Cristina Gutierrez-Vargas*; Elizabeth Calzada, B.S; Carylinda Serna, B.S; Linda Herrera, B.S; Rosa A. Maldonado, D.Sc. Department of Biological Sciences, Border Biomedical Research Center, The University of Texas at El Paso. 500 W. University Ave. El Paso, TX, 79968; and Omonike Olaleye, D.Sc. Department of Pharmaceutical Sciences, College of Pharmacy and Health Sciences, Texas Southern University, Houston, TX 77004

9:45 AM **Biomedical Section Meeting**

10:00 AM **Morning Break**

Biomedical Poster Presentations

U P518 Detecting potential quorum sensing inhibitors produced by skin and oral isolates using a *Chromobacterium violaceum* indicator strain

Erika Guin*, Patricia J. Baynham, St. Edward's University, Austin, TX, Aaron Conrado, and Marvin Whiteley, University of Texas at Austin, Austin, TX

U P535 Development of cell therapy products: Testing cell types and specific markers

Joseph P. Marin*, Rob Hatherill, Dirk Hunt, Robbie Johnson, Mary Pat Moyer, Del Mar College, Corpus Christi, Texas, INCELL Corporation, LLC, San Antonio, Texas

U P504 Development of Parkinson's Disease symptoms and pathology following exposure to the pesticide rotenone.

Katherine Najera

U P529 Do poplyphenolic antioxidant & coffee extract treatments rescue induced learning deficits in *Caernohabditis Elegans*?

Wendy Flores

U P536 Examining antioxidants' abilities to alter effects of Aß expression in transgenic *C. elegans* AD model

Cullen Soares, Fidelma O'Leary, He Liu (St. Edward's University, Austin, TX)

U P448 Examining the effects of brief exercise on cognitive function

John D. Boos*, Cynthia N. Alanis, Fidelma A. O'Leary, St. Edward's University, Austin, TX.

U P307 Locating genes responsible for -*N*-acetylglucosamine catabolism by *Pseudomonas aeruginosa*, a prominent respiratory pathogen in cystic fibrosis patients

John Taylor Gabriel*, St. Edward's University, Austin, TX, Aishwarya Korgaonkar, Marvin Whiteley, University of Texas at Austin, Austin, TX.

G P572 Methicillin-resistant *Staphylococcus aureus* in Cats of the Coastal Bend Region

Carla Michelle Rios*, Laura Gerla, Jean M. Escudero, Department of Biological and Health Sciences, Texas A&M University of Kingsville, TX, and Diamond Edwards, School of Veterinary Medicine, Tuskegee University

G P309 Patterns of fMRI hippocampal lamellar activation induced by Perforant Path stimulation in the Kainic Acid rat model of Epilepsy

Saul Jaime1, MS, Timothy Q. Duong3, PhD, Jose E. Cavazos1,2, MD PhD 1. Departments of Neurology, Pharmacology, and Physiology, UT Health Science Center, San Antonio, TX, United States. 2. San Antonio VA Epilepsy Center of Excellence, South Texas Veterans Health Care System, San Antonio, TX, United States. 3. Research Imaging Institute, UT Health Science Center, San Antonio, TX, United States.

G P435 Photoperiodic regulation of Aquaporin-11 expression in Syrian hamster testis.
John Shannonhouse, Li An Fang, William Lucas, Scott Goddard, Edward Jones, Henryk Urbanski, Caurnel Morgan

U P362 Post mortem assessment of the Translational Age and the tibial bone marrow compartment volume of a swine model (*Sus scrofa*) used for medical research
San Antonio Military Medical Center, Cardiology Service, Department of Medicine

Botany Section - Weir 201

Oral Presentations

8:30 AM NS 315 Comanche Peak Prairie Clover (*Dalea reverchonii*), a rare limestone glade endemic from North Central Texas
Allan Nelson*, Sam Kieschnick, Jim Goetze, and Bob O'Kennon, Tarleton State University (AN), Botanical Research Institute of Texas (SK and BO), and Laredo Community College (JG)

8:45 AM NS 594 Vegetation of the Christmas Mountains, Brewster County, Texas: An overview
David E. Lemke* and Matthew Donahue, Texas State University, San Marcos, TX

9:00 AM G 383 An annotated vascular flora of The Nature Conservancy Preserve of the Davis Mountains, Jeff Davis County, Texas
J. James Keeling, Sul Ross University, Alpine, TX

9:15 AM G 418 Are isolated populations of *Populus tremuloides* (Quaking Aspen) in the Davis Mountains of west Texas related?
Jerritt Nunneley*: UTSA / Texas Biomedical Research Institute and Dr. Oscar Van Auken: UTSA

9:30 AM G 371 Variation in vegetation structure in response to soil type, moisture regime, and elevation at Naval Outlying Field (NOLF) Goliad, Texas
Leah Rhyne, Texas A&M-Corpus Christi, Corpus Christi, TX

9:45 AM **Morning Break**

10:15 AM G 509 Variations in mescaline concentrations in the crown, subterranian stem, and root of *Lopophora williamsii* (Peyote) and ethnobotanical implications
Molly T. Klein*, M, M. Kalam and M. Terry

10:30 AM G 592 Temporal variation in the production of floral volatiles by the giant carrion flower (*Stapelia gigantea*)
Varsha Ramachandran* and David E. Lemke, Texas State University, San Marcos, TX

10:45 AM NS 461 Photosynthetic requirements of juvenile *Acer grandidentatum*
Terri Nelson Dickinson*, Northwest Vista College, San Antonio, TX and O.W. Van Auken, University of Texas at San Antonio

11:00 AM NS 451 Spore production in *Asplenium platyneuron* and *Woodsia obtusa* from Walker County, Texas
Joan Nester-Hudson*, Sam Houston State University, Huntsville, TX and Jessica Jemison

11:15 AM NS 598 A molecular phylogenetic study of the plant family Martyniaceae (order Lamiales) based on chloroplast and nuclear DNA
Raul Gutierrez, U.S. E.P.A. Region 6

11:30 AM **Botony Section Meeting**

Botony Poster Presentations

U P599 Dynamics of dry matter allocation in pod wall versus seed in common bean, *Phaseolus vulgaris*
Jenna M. Emerick*, St. Edward's University, Austin, TX and Michael A. Grusak, USDA-ARS Children's Nutrition Research Center, Department of Pediatrics, Baylor College of Medicine, Houston, TX

U P528 Seasonal occurence of epiphytic diatoms (Dinophyta) associated with the red algal genus *Batrachospermum* (Batrachospermales) in the South Concho River of west central Texas.
Lauren A. Langley* and Ned E. Strenth

G P357 Pathogenicity of *Alternaria alternata*, *Phoma sorghina* and *Fusarium moniliforme* on *Sorghastrum nutans* (L.) Nash
Madison Nelson*, Josephine Taylor, Stephen F. Austin State University, Nacogdoches, TX

U P423 Wetland plant phenology as influenced by variable climate: a preliminary study
Sheena Rooney* and Traesha R. Robertson, Texas Tech University, Waco, TX

Cell and Molecular Biology Section - Moody 211

Oral Presentations

8:45 AM G 313 Isolation of bacteriophages specific to *Escherichia coli*, *Staphylococcus aureus* and *Pseudomonas aeruginosa* from livestock fecal samples.
Jonathan Kang*, Dr. Crosby W. Jones, Department of Biology, Angelo State University, San Angelo, TX

9:00 AM U 333 Fgf8a interacts with ethanol to cause neural developmental defects
Matthew Perez*, St.Edward's University, Austin, TX and Neil McCarthy, Yohann Eberhart, The University of Texas at Austin, Austin, TX

9:15 AM U 380 Examination of the role of the calcineurin OSM-9 in mediating enhanced olfactory discrimination in *Caenorhabditis elegans*
Elizabeth Pelser*, Dr. Fidelma O'Leary, St. Edward's University, Austin, TX

9:30 AM U 401 Eavesdropping on bacterial communication: Can normal flora increase the resistance of *Pseudomonas aeruginosa* PA14 to Tobramycin, Ciprofloxin, or Tetracycline?
Anabel Rodriguez*, Dr. Patricia Baynham, St. Edward's University, Austin, TX and Aaron Conrado, Dr. Marvin Whiteley, University of Texas at Austin, Austin, TX

9:45 AM **Morning Break**

10:15 AM U 436 Modulation of acetylcholine signaling and its effects on protein aggregate clearance and toxicity in a transgenic *Caenorhabditis elegans* ASH neuron
Leslie Nix*, Dr. Fidelma O'Leary, St. Edward's University, Austin, TX

10:30 AM U 438 Isolation and characterization of an ethanol-sensitive Zebrafish mutant
Taylor Henegar*, St. Edwards Unidersity Austin, TX and Dr. Ben Lovely, Dr. Johann Eberhart, University of Texas at Austin

10:45 AM U 508 Quantifying the progressive loss of locomotive control in transgenic Parkinson's disease *C. elegans* strain, using BSR analysis.
Cassandra Boduch, Dr. Fidelma O'Leary, Dr. He. Liu, St. Edwards University, Austin, TX.

11:00 AM G 522 Methicillin-resistant *Staphylococcus aureus* in domestic cats of the Coastal Bend region
Carla Michelle Rios* and Jean Escudero, Texas A&M-Kingsville, Kingsville, TX

11:15 AM U 526 Inhibition of foam cell formation in mouse macrophage cells by resveratrol
Cristina Alvarado and Dr. Peter King, Saint Edward’s University, Austin, TX.

11:30 AM **Lunch**

1:00 PM U 595 The effect of resveratrol on phagocytosis
Georgiann Garza*, Rosalie Macias, and Dr. Peter King, St. Edward's University, Austin, TX

1:15 PM U 609 RNA-Seq analysis of phosphate-deprived Chlamydomonas cells reveals aspects of acclimation critical for cell survival
Matthew Wolski*, Miguel Angulo, Charles Hauser, St. Edward's University, Austin TX Arthur Grossman, Carnegie Institution for Science, Stanford CA

1:30 PM **Cell and Molecular Biology Section Meeting**

Cell and Molecular Poster Presentations

U P398 An epigenetic approach to insecticide resistance
Evan Jones* and Qiang Xu, Abilene Christian University, Abilene, TX 79699

NS P404 Apolipoprotein E 4/4 serum inhibits growth of malaria in culture
Hisashi Fukioka, Xiongwei Zhu, Case Western Reserve University, Cleveland Ohio; Clyde Phelix, Elizabeth Perry, George Perry*, The University of Texas at San Antonio, San Antonio, Texas

U P421 Cytotoxic and apoptotic effects of *Zingiber officinalea* (ginger root) and *Sanguinaria canadensis* (blood root) in 4T1 murine breast cancer cells.
Jarrett H. Ross*, Libby M. Saultz, Gary O. Gray and Adam J. Reinhart, Wayland Baptist University, Plainview, TX

U P367 Effects of nutritional stress on early development and patterning of *Drosophila melanogaster*
Roya Hossaini, St. Edwards University, Austin, TX

U P491 Enhancement of lipid production of the marine green microalgae *Nannochloris* sp
Heather Hernandez*, Ana Navarro, Mike Persans and Hudson DeYoe, University of Texas Pan American, Edingburg, TX

U P611 Homology-based construction of a protein interaction network for *Chlamydomonas reinhardtii*
Jesse Farek* and Charles Hauser, St. Edward's University, Austin TX

U P417 Identification of regulated gene sequences during regeneration in *Lumbriculus variegatus*.
Marianna Gonzalez*, Pompeyo R. Quesada, and Veronica G. Martinez-Acosta

U P479 Investigating essential amino acid metabolism using isobutyrate-resistant mutants in *Arabidopsis thaliana*
Erica M. Richardson* and Andrew W. Woodward, The University of Mary Hardin-Baylor, Belton, TX.

U P363 Isolation and identification of bacteria recovered from oral and skin samples
Madison Shaft*, St. Edward's University, Austin, TX, Aaron Conrado, Marvin Whiteley, PhD, University of Texas Austin, Austin, TX

G P471 Molecular cloning and characterization of cellulases and polygalacturonase genes of *Pectobacterium carotovorum* in *Escherichia coli*.
Eman Ibrahim*, Kim D. Jones, Jean Escudero Texas A&M University Kingsville, Kingsville, TX, and Ebtesam Naiem, Al Azhar University, Egypt

U P460 Retinoic acid regulates musculoskeletal attachments in the zebrafish head
Catherine Hughes, St. Edward's University, Austin, TX, Patrick McGurk and Johann Eberhart, University of Texas at Austin, Austin, TX.

NS P579 Separation of supercoiled and relaxed DNAs electrophoresed in varying concentrations of ethidium bromide
David Foglesong*, Navya Kondapalli, and Richard Alaniz, University of the Incarnate Word, San Antonio, TX.

U P591 Sulfur-dependent selenate accumulation and toxicity in Chlamydomonas
Chelsey Friedrichs*, Jordan Jones, Aaron Luckevich, Charles Hauser, St. Edward's University, Austin TX 78704

U P610 Systems biology approach in *Chlamydomonas reinhardtii* reveals connections between phosphate nutrition and multiple metabolic pathways
Miguel Angulo*, Matthew Wolski, Charles Hauser, St. Edward's University, Austin TX Arthur Grossman, Carnegie Institution for Science, Stanford CA

U P459 The effects of genetic background on the expressivity of EGFR pathway mutations affecting *Drosophila melanogaster* eggshell patterning.
Laura Youngblood*, Lisa M. Goering, St. Edward's University, Austin, TX

U P478 The effects of naturally occurring cardioprotective compounds and possible synergy with resveratrol on macrophage function
Jana Soares,* Peter J. King. St. Edward's University, Austin, TX.

U P381 The effects of oxygen culture levels on the adaptive response of two-dimensional (2D) mono layer and three-dimensional (3D) epithelial micro-cell culture systems

Desirey Flores*, Torsten Groessor, John Hatherill, Pricilla Cooper, University of California at Berkeley, Berkeley California, Del Mar College, Corpus Christi Texas

U P505 The role of *orthodenticle* in early embryonic patterning in *Drosophila simulans*
Stephanie Pace and Dr. Lisa Goering, St. Edward's University, Austin, TX

U P455 Use of crowdfunding in undergraduate research
Kande Jones*, Abilene Christian University, Abilene, TX

Chemistry and Biochemistry Section - Moody 203

Oral Presentations

10:15 AM G 342 Dibenzyltindihalides: synthesis, structures, and bioactivity
Alma Miramontes, Alejandro Metta-Magana, Keith Pannell

10:30 AM U 428 Changes in the number and position of OH stretching bands associated with substitution of electron releasing and withdrawing groups in phenols
Emily R. Caudill* and J.D. Lewis, Department of Chemistry, St. Edwards's University, Austin, TX 78704

10:45 AM U 430 Variations in the infrared OH stretching band region associated with substitution of ethanols and propanols
Elizabeth Tuggle* and J.D. Lewis, Department of Chemistry, St. Edwards's University, Austin, TX 78704

11:00 AM U 597 Troubleshooting a solvent assay for triclosan quantification
Elizabeth Fawcett, Dr. Kiley P-H Miller

11:15 AM **Chemistry and Biochemistry Section Meeting**

Chemistry and Biochemistry Poster Presentations

U P565 A comparison of techniques for extracting oils from differing algal species
Toni Cowan*, Gary Stanlake, and Richard Garner, Hardin-Simmons University, Abilene, TX

U P556 A model for the treatment of poly-Q based diseases
Eamonn F. Healy, Carley E. Little*, St. Edward's University, Austin, TX

U P358 A novel application of EMSA and DSLR technology for detecting RecA binding to *Mycobacterium tuberculosis* DNA sequences
Hailey Budnick*, Jessica Kenneson*, Robert Moore, Wayland Baptist University, Plainview, TX.

U P431 Changes in infrared spectra associated with halogen bonding
Olivia Collado* and J.D. Lewis, Department of Chemistry, St. Edwards's University, Austin, TX 78704

U P564 Comparison of ability of *P.aeruginosa* to biodegrade diesel, hexadecane, and dodecane in water and soil contaminated with known concentrations of sodium chloride
Jon Ury*, James Walter, Gary Stanlake, and Richard Garner, Hardin-Simmons University, Abilene, TX

U P585 Comparison of acid hydrolysis and enzymatic digestion of biological macromolecules as an initial stage of biogas generation
Tamika Harford*, James Masuoka, Midwestern State University, Wichita Falls, TX

U P543 Effects of pH changes on the charge-discharge properties of lithium manganese nickle oxide spinel cathodes for lithium rechargeable batteries
Martin Trujillo*, University of Texas of the Permian Basin, Odessa, TX and Isaac Orth, Pat Nandakumar, Midland College, Midland, TX

U P500 Extreme makeover chromatin edition: Chromatin remodelers in the postrecruitment regulation of transcription
Hillary Eichelberger*, Alice Hodde* and Sarah K. Lee. Abilene Christian University, Abilene, TX

G P488 Lipid and fatty acid composition of prickly pear cactus (genus *Opuntia*) fruits and pads
Rinkal Patel and Michael Shipley, Department of Biology, Midwestern State University, Wichita Falls, TX 76308

U P323 Novel Grignards: New methodology towards an efficient route to *Fumagillin*
Colby M. Adolph*, Dr. Danette Vines, Schreiner University, Kerrville, Tx

U P547 Predicting solvent blend miscibility
James Huskey* and Darren Williams, Sam Houston State University, Huntsville, TX

U P563 Production of hydrogen gas by the reaction of hydrochloric acid with elemental copper
Chris Hughes, Pat Larsen*, and Richard Garner, Hardin-Simmons University, Abilen, Texas

U P340 Silanes as mild reductants for amides involving organic catalysis
Renzo Arias Ugarte, Jorge Martinez*, Keith H. Pannell, University of Texas at EL Paso

U P321 Solubility studies using co-solvent system combinations for a poorly water soluble drug
Senan Rasheed*, Tahir Ismail, Anna Duke* , Kristof Kovacs, Tibor Barcza, Mario Jane*, Ilona Petrikovics

Computer Science Section - Moody 105

Oral Presentations

8:30 AM U 348 A comparative analysis between an analytical method and design software for solving fluid power problems
Tarebi John*, Dr. Jan Brink, Midwestern State university, Wichita Falls, TX

8:45 AM U 507 Wolfscript: A programming language for Android
Erick W. Bauman, Southwestern University, Georgetown, TX

9:00 AM **Computer Science Section Meeting**

Computer Science Poster Presentations

U P602 Computational origami: Development of origami bases
Jessica Miller

U P600 Magic lights
Adam Kumm

U P388 Predicting a user's next location, given a minimum of four weeks driving data
Gary Phillip, Midwestern State University (UGROW 2012)

U P483 Using SimTraffic
Tommy McLeroy

Conservation Ecology Section - Moody 105

Oral Presentations

9:15 AM G 325 Impacts of a high intensity wildfire on abundance, movement, and diversity of herpetofauna in the Lost Pines ecoregion of Texas
Donald J. Brown*, Michael R.J. Forstner, Texas State University, San Marcos, TX

9:30 AM U 359 Nocturnal or diurnal? Day and night activity patterns of the Georgetown Salamander (*Eurycea naufragia*)
Kira D. McEntire* and Benjamin A. Pierce, Southwestern University, Georgetown, TX

9:45 AM **Morning Break**

10:15 AM G 408 The use of ant species as bioindicators
Ann B. Mayo, University of Texas-Arlington

10:30 AM NS 552 Herbivory effects on oak species
Fernando A. Martinez*, Janis K. Bush, University of Texas at San Antonio, San Antonio, Texas

10:45 AM G 569 Trapping turtles using hoop-nets: Testing assumptions and potential biases
Ivana Mali*, Donald J. Brown, Michael R.J. Forstner, Texas State University, San Marcos, TX

11:00 AM G 314 Oak-Juniper Woodlands of Central Texas: A Decade of Change
Adam Duarte (Texas State University), Jennifer L. R. Jensen (Texas State University), Jeff S. Hatfield (USGS Patuxent Wildlife Research Center), & Floyd W. Weckerly (Texas State University)

11:15 AM **Conservation Ecology Section Meeting**

Conservation Ecology Poster Presentations

U P568 Effects of armored catfish on native amphibians in Texas
Cynthia Owsley*, Michael Redman, Chris Distel : Schreiner University

NS P573 Long term population monitoring of Great Blue Heron *Ardea herodias* by citizen scientists on the Cibolo Preserve
D.L. Taylor , Cibolo Nature Center, Boerne, TX and J.W. Pieper, Alamo Area Master Naturalists, San Antonio, TX.

G P557 Population density and microhabitat composition of the Seaside Sparrow on Laguna Atascosa National Wildlife Refuge, Cameron County, Texas.
Jacqueline Ferrato*, Mark Conway, Michael Small, Joseph Veech, Thomas R. Simpson

U P411 Potential use of natural melanophore patterns for recognition of individual Georgetown salamanders (*Eurycea naufragia*)
Kira D. McEntire, Jenifer W. Harren*, Alexandria L. Hill*, Rachel C. Cross*, and Benjamin A. Pierce, Southwestern University, Georgetown, TX

NS P335 Habitat use of *Peromyscus leucopus* during a long-term drought: Indication of a restriction of habitat by a generalist.
Troy A. Ladine, East Texas Baptist University

Environmental Science Section - Weir 109

Oral Presentations

8:30 AM U 318 Potential of using Sea Hares as biomonitors of heavy metals in the Laguna Madre, Texas
Zach Badaoui and Frank Dirrigl Jr, Department of Biology, The University of Texas-Pan American

8:45 AM U 319 Water quality gradients of nutrients, CDOM, and Phytoplankton along an irrigation canal
Tess Thomas, Itzel Torres, and Frank Dirrigl Jr, Department of Biology, The Univeristy of Texas Pan American

9:00 AM U 343 Analysis of a 13 year El Paso city rainfall record from fire stations as a function of region.
Nessly Torres, Keith Pannell

9:15 AM NS 370 The effects of carbon dioxide on milkweed (Asclepiadaceae) and monarch butterfly (*Danaus plexippus*) larva
Terri J. Matiella, Ph.D., Janis K. Bush, Ph.D., University of Texas San Antonio

9:30 AM NS 391 Development of a healthy watershed protection plan in the Upper Llano River Watershed, Texas
Emily Seldomridge*, Tom Arsuffi, Donn Edwards, and Preston Bean, Llano River Field Station, Texas Tech University, Junction, TX

9:45 AM **Morning Break**

10:15 AM U 456 Differential impacts of organic and synthetic pesticides on the non-target organism *C. elegans*

Leah E. Mulaly*, Fidelma A. O'Leary. St. Edward's University, Austin, TX

10:30 AM U 463 Community succession in a tallgrass prairie following bioremediation of a crude oil spill
Samantha A. Saldivar*, Emily G. Adams, Kimbell L. Pamplin, Joshua M. Brokaw, Abilene Christian University, Abilene, TX

10:45 AM G 475 Population dynamics and distribution of Diamondback Terrapin (*Malaclemys terrapin*) in West Bay Galveston, Texas
Abby Marlow (University of Houston Clear Lake, School of Science and Computer Engineering) and George Guillen (University of Housotn Clear Lake and Environmental Institute of Houston)

11:00 AM U 511 Altered gene expression following exposure to the pesticide imidacloprid: possible basis of inherited learning deficit in *C. elegans*
Linda Armstrong*, Dr. He Liu, Dr. Fidelma O'Leary, Saint Edward's University, Austin, TX

11:15 AM G 571 A geochemical and microbial diversity survey of a natural iron seep within Big Bend Ranch State Park
Julia Green*, Jackie Denson, Sul Ross State University, Alpine, TX.

11:30 AM **Lunch**

1:00 PM U 574 Malathion uptake in armored catfish
Jake Crawley*, Jadher Abad, Chris Distel : Schreiner University

1:15 PM G 583 *In situ* salinity effects on the Carolina wolfberry (*Lycium carolinianum*)
Kelsey Pearman, Ashley Bogrand, Ella Grace Borne, Niki Ragan and Jeffrey R. Wozniak, Sam Houston State University, Huntsville, TX and Elizabeth Smith, International Crane Foundation, Corpus Christi, TX

1:30 PM G 589 Landscape level patterns in saltmarsh pond salinity at Aransas National Wildlife Refuge
Niki Ragan*, Ashley Bogrand, Ella Grace Borne, Kelsey Pearman, Jeffrey R. Wozniak, Sam Houston State University, Huntsville, TX, and Elizabeth Smith, International Crane Foundation, Corpus Christi, TX

1:45 PM **Environmental Science Section Meeting**

Environmental Science Poster Presentations

U P525 16S rRNA identification and genetic characterization of putative arsenic-oxidizing bacteria from the Lower Laguna Madre of South Texas
Thomas A. Eubanks*, Laura A. Torres, Erin L. Schuenzel, and Kristine L. Lowe, University of Texas - Pan American, Edinburg TX

U P484 Arsenic-induced stress indicators in the seagrass, *Thalassia testudinum*
Peter Cerda*, Yesenia Cerino, Marlon Duran, Esteban Triplett, Mike Persans and Hudson DeYoe

U P345 Development and Implementation of *Sargassum* Early Advisory System (SEAS): Phase 1
Brandon Hill*, SEAS, Texas A&M at Galveston

U P349 Do landscaping choices make a difference on *Midwestern State University* campus buildings?
Wenisha Gabriel, Midwestern State University, Wichita Fall, TX

NS P462 Effects of large vertebrate herbivory on *Acer grandidentatum*
Terri Nelson Dickinson*, Northwest Vista College, San Antonio, TX and O.W. Van Auken, University of Texas at San Antonio

U P548 Influence of calcium concentrations and acidity on shell growth and formation in the freshwater snail, *Planorbella trivolvis*
Francis Horne, Biol. Dept., Texas State University, San Marcos, Texas

U P346 Investigation of the Gulf of Mexico as a nursery ground for Sagassum
Kirsten Stokes, Houston, TX, Texas A&M University at Galveston

U P558 Investigation of the Gulf of Mexico as a nursery ground for sargassum
Kirsten Stokes, Houston, TX, Texas A&M University at Galveston

U P492 Is arsenic tolerance in marine *Streptomyces* due to the presence of arsenic resistance genes *arsA*, *arsB*, and *arsC*?
Ramiro Garza* and Kristine L. Lowe, University of Texas - Pan American, Edinburg TX

U P407 Photosynthetic characteristics of *Ascplepias curassavica* under current and predicted increased levels of atmospheric carbon dioxide.
Emily Jackson*, Janis K. Bush, Anna Boeck, and Terri Matiella, University of Texas at San Antonio

U P485 Potential effects of destratification on the phytoplankton of the Arroyo Colorado
Diana Huallpa and Hudson DeYoe

U P353 Relationship Between Avian Abundance and Measures of River Impairment in Central Texas
Chad S. Sundol*, Anna K. Boeck, Janis K. Bush The University of Texas at San Antonio, San Antonio TX, 78249, Ryan Bass City of Boerne, Upper Cibolo Creek Watershed Coordinator, Boerne, TX, 78806

Freshwater Science Section - Weir 110

Oral Presentations

8:30 AM G 331 Possible competition between two congeners; Endangered *Gambusia nobilis* and invasive *Gambusia geiseri* in a reconstructed desert wetland habitat, Balmorhea State Park, Texas
Kelbi Delaune* and Chad Hargrave, Sam Houston State University, Huntsville, TX

8:45 AM G 347 Salinity preference, tolerance, and osmoregulatory capacity of the fully aquatic salamander, *Amphiuma tridactylum*
Shelly C. McCain* and William I. Lutterschmidt, Sam Houston State University, Huntsville, TX

9:00 AM NS 351 Harvest and taxation strategies given uncertain mathematical models: Towards discerning the true nature of predator-prey natural resource systems
Dale B. McDonald, McCoy School of Engineering, Midwestern State University, TX

9:15 AM U 364 The apple doesn't fall far from the tree: Reproductive characterization of the newly renamed apple snail, *Pomacea megastoma*
Allyson Plantz*, Cristhian Clavijo, Fabrizio Scarabino, Katie Gibson, Ana Elise Rohrdanz and Romi Burks, Southwestern University, Georgetown, TX

9:30 AM U 372 My omnivore dilemma: Diet flexibility in two different apple snails, *Pomacea maculata* and *P. canaliculata*
Tracy V. Day* and Romi L. Burks, Southwestern University, Georgetown, TX

9:45 AM **Morning Break**

10:15 AM G 394 Recreational effort and economic impact of Guadalupe bass angling in Central Texas Streams.
Zachary Thomas* and Tom Arsuffi, Texas Tech University, Lubbock, TX

10:30 AM G 395 A checklist to the common fishes of the Bull and Upatoi Creeks Watershed of Georgia
Samantha L. Martin* and William I. Lutterschmidt, Sam Houston State University, TX

10:45 AM U 412 Potential effects of global warming on stream ecosystem structure and function
Jacqueline Lee* and Chad Hargrave, Sam Houston State University, Huntsville, TX

11:00 AM NS 413 Conservation status of the endangered Comanche Springs Pupfish and Pecos Gambusia in the San Solomon Spring complex
Chad Hargrave*, Sam Houston State University, Huntsville, TX, Gary Garrett, David Riskind, Texas Parks and Wildlife Department, Austin, TX, Mark McKinstry, Bureau of Reclamation, Salt Lake City, UT

11:15 AM U 414 Fitness costs of larval trematodes in two closely related poeciliids with different reproductive strategies.
Edwin Quintero, Department of Biology, The University of Texas-Pan American, Edinburg, TX

11:30 AM **Lunch**

1:00 PM NS 429 Energy reserves in mayfly naiads and adults (*Hexagenia limbata*) from a north central Texas lake
Michael Shipley, Department of Biology, Midwestern State University, Wichita Falls, TX

1:15 PM G 450 Biogeography and ecosystem function of major aquatic bacterial groups in a Gulf Slope (TX) river system

Jesse C.Becker*, W.H. Nowlin, and D.Hahn, Department of Biology, Texas State University, San Marcos, TX

1:30 PM U 454 Double trouble for local salamanders: substrate and food availability for two populations of the endangered Georgetown salamander, *Eurycea naufragia*

Jonathan O. Miley*, Tracy V. Day, Allyson L. Plantz, and Romi L. Burks, Southwestern University, Georgetown, TX.

1:45 PM NS 603 Monogamous biparental care in the invasive Rio Grande Cichlid: How the brain shapes behavior

Ronald G. Oldfield*, Sam Houston State University, Huntsville, TX, Kapil Mandrekar, State University of New York, Syracuse, NY, Rayna M. Harris, Hans A. Hofmann, Dean A. Hendrickson, The University of Texas at Austin, Austin, TX

2:00 PM **Freshwater Science Section Meeting**

Freshwater Science Poster Presentations

U P582 Aquatic invertebrate community composition and similarity among playas with different land use

Jacob Kemmer*, Kady Pryde, Jarrett Ross, Trevor Burrow, Victoria Chavez, Edward Taragon, and Andrew C. Kasner, Wayland Baptist University, Plainview, TX

U P542 Investigating potential factors that may influence gregarine parasitism variability among populations of the damselfly, *Argia moesta*, in central Texas

Rodney L. Duckett*, Kayla McCormack, and Jason L. Locklin, Department of Biology, Temple College, Temple, TX

G P433 Parasite diversity of mosquitofish (*Gambusia* sp.) from the Red Arroyo

L. Austin Gilbert* and Nicholas J. Negovetich, Angelo State University, San Angelo, TX

U P481 Seasonal variation in reproduction of the largespring Gambusia, *Gambusia geiseri*, in two spring systems in Texas

Tamara Fraker* and Raelynn Deaton, St. Edwards University, Austin, TX

G P445 Storm mediated changes in nitrogen and phosphorus uptake length in a spring fed river

Aaron Swink*, Weston Nowlin and Benjamin Schwartz, Department of Biology, Texas State University, San Marcos, TX

U P516 Using personality traits to identify potential for invasivness in two livebearing fishes (*Gambusia affinis* and *Gambusia geiseri*)

Jack Sawin* and Raelynn Deaton, St. Edward's University, Austin, TX, Craig Sargent, University of Kentucky, Lexington, KY, Robert Hopkins, University of Rio Grande, OH

Geoscience Section - Weir 017

Oral Presentations

8:30 AM U 317 Depositional interpretation using integrated sedimentological and paleontological data from a fossil-bearing unit within the Blackwater Draw Formation, Plainview, Texas

Taryn Shadden*, David Schmidt, Wayland Baptist University, Plainview, TX and Brian Steffen, South Louisiana Community College, New Iberia, LA

8:45 AM U 332 Geological mapping of late Cretaceous to late Eocene strata within the Indian Creek area, Buffalo Gap National Grasslands, South Dakota

Garrett Williamson*, David Schmidt, and Tim Walsh, Wayland Baptist University

9:00 AM NS 464 Polydeformation indicators in the Packsaddle Schist Near Mason, TX

Chris A. Barker* and R. LaRell Nielson, Stephen F. Austin State University, Department of Geology, Nacogdoches, Texas 75962

9:15 AM NS 473 Stromatolitic Bioherms in the Upper Cambrian, Point Peak Member of the Wilberns Formation near White's Crossing, south of Mason, Texas

R. LaRell Nielson* and Chris Barker, Stephen F. Austin State University

9:30 AM NS 506 Does Excel affect learning?: An assessment of spreadsheet-based modules in a Physical Geology Course

Heather L. Lehto, Angelo State University, San Angelo, TX and H. Len Vacher, University of South Florida, Tampa, FL

9:45 AM **Morning Break**

10:15 AM G 540 Well exposed Tertiary sills inflate Cretaceous Boquillas formation: SE Brewster County, Big Bend National Park, Texas.

Jeff Cullen*, Stephen F Austin State University, Nacogdoches, TX, Nathan Knox, and Joseph Satterfield, Angelo State University, San Angelo, TX

10:30 AM U 551 Pitfalls and challenges of dating deformations: Changing timing interpretations in the Sand Springs Range, western Nevada

Joseph I. Satterfield*, Angelo State University, San Angelo, TX and John S. Oldow, University of Texas at Dallas, Richardson, TX

10:45 AM NS 570 What we have learned: Field experiences in West Texas

James W. Ward and Joseph I. Satterfield, Angelo State University, Department of Physics and Geosciences, San Angelo, TX

11:00 AM **Geoscience Section Meeting**

Geoscience Poster Presentations

U P410 A taxonomic and taphonomic description of an ungulate fossil from the Chadron Formation of the Buffalo Gap National Grasslands, South Dakota

Hunter Green*, and David Schmidt, Wayland Baptist University

G P334 Delineation of speleogenetic development in the Owl Mountain province: Fort Hood Military Installation, Texas

Melinda Shaw Faulkner*, Kevin W. Stafford, Aaron W. Bryant, Stephen F. Austin State University

U P386 Geochemical analysis of aquifers in the Concho River watershed, TX

Garrett Harris, James W. Ward, PhD, Angelo State University

U P477 New geologic mapping in the southern Marathon Uplift

Jacob C. Crouch*, Miguel Rodriguez, and Joseph I. Satterfield, Angelo State University, San Angelo TX

U P555 Using multpile logistic regression and artificial neural network models to predict elevated bacteria concentrations in natural waters

Daniel A. Garza*, Vaden J. Aldridge, James W. Ward, Angelo State University, San Angelo, Tx and Jarrett K. Louder, Texas Tech University, Lubbock, Texas

Marine Science Section - Weir 111

Oral Presentations

8:30 AM NS 369 *Marine Plants of the Gulf Coast*, a new book and information on the Laguna Madre Field Station

Roy L. Lehman, Texas A&M University-Corpus Christi, Department of Life Science

8:45 AM U 378 Behavioral characteristics in the sea slug, *Elysia crispata* in relation to light intensity

Jonathan Patterson*, Elizabeth Mitchell, McLennan Community College, Waco TX, Mary Rumpho-Kennedy, Karen Pelletreau, University of Connecticut, Storrs CT, Adam Lord, Texas Tech University at Waco, Waco TX, and Sondra Dubowsky, McLennan Community College, Waco TX

9:00 AM G 390 The spatial and temporal distribution of the seagrasses and drifting macroalgae of Emmord's Seagrass Meadow in the Laguna Madre.

Veronica Thompson & Roy L. Lehman; Texas A&M University Corpus Christi

9:15 AM G 439 Lafitte's Cove case study: Complications arising from USACE Wetland permitting

Jason Hopkins, Emilie Johannes*, Mike Ross, & Tiffany Woodcock, Texas A&M University at Galveston, Galveston, TX

9:30 AM G 495 San Martin Lake: Loved by many, studied by few.
Wendy Rogers* and Dr. Hudson DeYoe, The University of Texas-Pan American

9:45 AM **Morning Break**

10:15 AM G 496 To Catch as Catch Can: Using otoliths to determine age of red snapper, *Lutjanus campechanus,* for use in developing effective management in Texas waters
Nicole Carrillo, Texas A&M at Galveston

10:30 AM G 497 An experimental test of the effects of disturbance frequency on the diversity of artificial reef fouling communities
Jonathan Le, David Hicks, Carlos Cintra-Buenrostro, Biological Sciences Department, University of Texas Brownsville, 80 Fort Brown, Brownsville, TX, 78520, and Dale Shively, Texas Parks and Wildlife Artificial Reef Program, 4200 Smith School Rd, Austin, TX, 78744

10:45 AM G 503 The effects of a red tide, *Karenia brevis* episode on the benthic macroinvertebrate communities of South Padre Island,Texas
Liana Lerma*, David W. Hicks, University of Texas at Brownsville, Brownsville, TX.

11:00 AM G 515 The use of underwater surgical techniques to reduce mortality in fish studies utilizing acoustic tagging
Andres Garcia*, Richard Kline, David Hicks, Carlos Cintra-Buenrostro, University of Texas at Brownsville, Brownsville, TX and Dale Shively, Texas Parks and Wildlife Artificial Reef Program, Austin, TX.

11:15 AM NS 567 GoMexSI: An international estuarine and marine species interaction database for a large sub-tropical marine ecosystem
James D. Simons, Texas A&M University, Center for Coastal Studies, Corpus Christi, TX, Maru Vega-Cendejas, Centro de Investigacion y de Estudios Avanzados del Instituto Politecnico Nacional, May Yuan, Center for Spatial Analysis, University of Oklahoma, Norman, OK, Cristina Carollo, Harte Research Institute, Texas A&M University, Corpus Christi, TX, Cristina M Schoonard, Florida Wildlife Research Institute, St. Petersburg, FL, Tinara Hendrix, Software Consultant, San Antonio, TX, and Jorrit Poelen, Software Consultant, Oakland, CA

11:30 AM **Lunch**

1:00 PM G 575 Functional aspects of the placoid scales surrounding the superficial neuromast of the bonnethead shark (*Sphyrna tiburo*).
Martin Donley

1:15 PM U 615 Investigation of the Gulf of Mexico as a nursery ground for *Sargassum*
Kirsten Stokes and Robert K. Webster, Texas A&M University, Galveston, TX.

1:30 PM **Marine Science Section Meeting**

Marine Science Poster Presentations

U P549 Development and implementation of Sargassum Early Advisory System (SEAS): An investigation of the loop system, warm water eddies, currents and energy that create Sargassum locomotion
*Brandon N. Hill, Captain Webster

U P539 Phytoplankton nutrient limitation in the Brazos-Santiago Pass, South Padre Island, Texas.
Aegean Castañeda*, Dennis Lee*, Jack McDaniel, Xenia Brianna Gonzalez, Carmen Gómez, Isaac Peña, The International Baccalaureate Program at Lamar Academy, McAllen I.S.D., McAllen, Texas, Hudson DeYoe, Department of Biology and the Center for Subtropical Studies, The University of Texas-Pan American, Edinburg, Texas, and Joseph Kowalski. The International Baccalaureate Program at Lamar Academy, McAllen I.S.D., McAllen, Texas and Department of Biology and the Center for Subtropical Studies, The University of Texas-Pan American, Edinburg, Texas.

U P538 Primary productivity in the Lower Laguna Madre and Arroyo Colorado, Texas.

Xenia Brianna Gonzalez*, Isaac Peña*, Carmen Gómez, Jack McDaniel, Dennis Lee, and Aegean Castañeda, The International Baccalaureate Program at Lamar Academy, McAllen I.S.D., McAllen, Texas, Hudson R. DeYoe, Department of Biology and the Center for Subtropical Studies, The University of Texas-Pan American, Edinburg, Texas, and Joseph L. Kowalski, The International Baccalaureate Program at Lamar Academy, McAllen I.S.D., McAllen, Texas, and Department of Biology and the Center for Subtropical Studies, The University of Texas-Pan American, Edinburg, Texas.

U P537 Seagrass abundance patterns in the Lower Laguna Madre.

Carmen Gomez*, Jack McDaniel*, Xenia Brianna Gonzalez, Isaac Peña, The International Baccalaureate Program at Lamar Academy, McAllen I.S.D., McAllen, Texas, Hudson R. DeYoe, Department of Biology and the Center for Subtropical Studies, The University of Texas-Pan American, Edinburg, Texas, John Garcia, Edwin Quintero, Department of Biology, The University of Texas-Pan American, Edinburg, Texas and Joseph Kowalski, The International Baccalaureate Program at Lamar Academy, McAllen I.S.D., McAllen, Texas, and Department of Biology and the Center for Subtropical Studies, The University of Texas-Pan American, Edinburg, Texas.

U P487 Seagrass epiphyte biomass patterns in the Lower Laguna Madre.

Edwin Quintero*, Joseph Kowalski and Hudson DeYoe

U P489 Sediment grain size patterns in the Lower Laguna Madre

John Garcia*, Esteban Triplett, Mark Besonen, Joseph Kowalski and Hudson DeYoe

U P329 The effects of pH and algal coverage on Coral Reef health in Roatan, Honduras

Lauren Scott, McLennan Community College

U P490 Variation in elemental composition of the seagrass *Halodule wrightii* from the Lower Laguna Madre

Esteban Triplett*, Jason Parsons, Joseph Kowalski and Hudson DeYoe

Mathematics Section - Weir 201

Oral Presentations

1:00 PM NS 324 The Arithmetic-Geometric Mean Inequality in Precalculus

Elsie M. Campbell* and Dionne T. Bailey*, jointly

1:15 PM U 355 Can't Stop: When things get a bit "dicey"

Colin Williams*, Seth Reed, Kathleen Garza, Liliana Guia, Dr. Stefan T. Mecay, Schreiner University, Kerrville, TX

1:30 PM NS 605 How does the loss due to follow up affect the results of survival analysis?

John A. Ward, Brooke Army Medical Center Fort Sam Houston, TX.

1:45 PM **Mathematics Section Meeting**

Neuroscience Section - Moody 106

Oral Presentations

8:45 AM G 356 The role of cytokines on the inflammatory status of the amygdala, hippocampus and hypothalamus following quercetin administration in a diabetic rat model

Muraya L Gonzalez*, Carlos A. Garcia, University of the Incarnate Word, San Antonio, TX and Sara Mahoney, Texas A&M - Kingsville

9:00 AM G 360 Basal orbitofrontal IL-6 facilitates reversal learning in the rat

Jennifer Donegan*, Milena Girotti, Miranda Morgan, David Morilak, University of Texas Health Science Center at San Antonio, San Antonio, TX

9:15 AM G 553 Cross-talk and signalling between ethanol and acetone during rapid exposure using Drosphila Melanogaster as a model organism

Sarai Salinas and Enrique Massa, Ph.D.

9:30 AM NS 523 Transcranial laser stimulation of cognitive and emotional functions in humans

Francisco Gonzalez-Lima* and Douglas W. Barrett, Department of Psychology and Institute for Neuroscience, University of Texas at Austin, Austin, TX 78712

9:45 AM **Morning Break**

10:15 AM **Neuroscience Section Meeting**

10:30 AM **Advances in Human Brain Imaging Research - Peter Fox, UT Health Science Center**

11:30 AM **Lunch**

Neuroscience Poster Presentations

U P415 Beta-catenin, an early develomental transcription factor, is upregulated in the Lumbriculid central nervous system during nerve regeneration.

Laura D. Molinar* and Veronica G. Martinez-Acosta, Univ. of the Incarnate Word, San Antonio, TX 78209

U P498 Comparing the effectivenes of acquisition rehearsal learning, and retrieval rehearsal learning, in the creation of long-term declarative memories.

Michelle Hundt, Louie Morsy, Patrick Scholl*, Fidelma O'Leary. St. Edward's University, Austin, Tx

U P544 Comparing the effects of glucocorticoids and mineralocorticoids in the stimulation of embryonic zebrafish neurodevelopment and nestin gene expression

Eugene C. Nwankwo* and Amaris R. Guardiola, Angelo State University, San Angelo TX

U P426 Difference in respiratory exchange ratio and CRF mRNA leves response to social housing conditions in Syrian female hamsters

Li An Fong*, John Shannonhouse, Bryan Clossen, Ross Hairgove, Lauren Mertesdorf, Margie Patel, Caurnel Morgan, Texas A&M University, College Station, TX

U P510 Examination of the effects of physiological stress and cortisol levels on the acquisition of long-term declarative memories.

Paloma Reinoso*, Vanessa Neutzler, and Fidelma O'Leary, St. Edward's University, Austin TX

NS P327 Hydroxynonenal intramolecular crosslinking of neurofilaments

Elizabeth A. Perry, George Perry*, The University of Texas at San Antonio; Rudy J. Castellani, University of Maryland, Baltimore, Maryland; Paula I. Moreira, University of Coimbra, Coimbra, Portugal

NS P476 Oxidative Stress and Apoptosis in the Progression of Alzheimer's Disease in the Hippocampal CA1 Region

Clyde F. Phelix*, George Perry, The University of Texas at San Antonio, San Antonio, TX and R. Kilian Schafer, Texas Tech University Health Science Center, El Paso, TX

Physics Section - Moody 113

Oral Presentations

8:30 AM G 326 Phase Diagram for Magnon Condensate in Yttrium Iron Garnet film

Fuxiang Li*, Wayne M. Saslow, Dept. of Physics A&M Univ., Valery L. Pokrovsky, Dept. of Physics, Texas A&M Univ. , College Station, TX and Landau Institute for Theoretical Physics, Chernogolovka, Moscow District142432, Russia

8:45 AM G 337 Intensity-resolved above threshold ionization of Xenon

N. Hart, J. Strohaber, G. Kaya, A. A. Kolomenskii, and H. A. Schuessler

9:00 AM U 352 Light Curves & Rotational Periods for Main Belt Asteroids

Cassidy Cantu, Hardin-Simmons University

9:15 AM G 373 Detection of chromosome optical activity by light scattering from dinoflagellate nuclei

Jianping Liu, George W. Kattawar, Texas A&M University, College Station, TX

9:30 AM U 377 Energy harvest and collection from automobile traffic using active road rumbles
Robert Rorabaugh*, Abhishek Chatterjee, Christopher Venegas, and M. Salim Azzouz

9:45 AM **Morning Break**

10:15 AM G 402 Dependence of levitation force on frequency of an oscillating magnetic levitation field in a bulk YBCO superconductor
Hamilton Carter Texas A&M University

10:30 AM G 443 Possible generation of coherent X and gamma radiation by collective parametric resonance
Xiwen Zhang and Anatoly Svidzinsky, Department of Physics and Astronomy, Texas A&M University, College Station, TX

10:45 AM NS 447 Lasing with no population in excited state produced by parametric excitation of collective atom-field oscillations
Anatoly Svidzinsky*, Luqi Yuan and Marlan Scully, Texas A&M University, College Station, TX

11:00 AM G 457 Underwater imaging using Backward Monte Carlo Vector method
Dayou Chen*, George W. Kattawar

11:15 AM G 474 Observation of the transition from superfluorescence to superradiance
Zhenhuan Yi*, Pankaj K. Jha, Luqi Yuan, Alexander Sinyukov, Dmitri V. Voronine, Ziyun Di, Vladmir A. Sautenkov, Alexei V. Sokolov, Texas A&M University, College Station, TX; Yuri V. Rostovtsev, University of North Texas, Denton, TX and Marlan O. Scully, Texas A&M University, College Station, TX, Baylor University, Waco, TX and Princeton University, Princeton, NJ

11:30 AM **Lunch**

1:00 PM NS 499 Time-resolved surface-enhanced CARS spectroscopy
Dmitri V. Voronine*, Alexander M. Sinyukov, Xia Hua, Charles Ballmann, Alexei V. Sokolov, Texas A&M University, TX and Marlan O. Scully, Texas A&M, Princeton and Baylor Universities

1:15 PM G 512 Searching for physics beyond the standard model with dilepton mass distributions at the LHC
Sean Wu Texas A&M University

1:30 PM G 514 Searching for top squarks at the Large Hadron Collider in fully hadronic final state
Bhaskar Dutta, Teruki Kamon, Kuver Sinha, Kechen Wang*, Texas A&M University, College Station, TX and Nikolay Kolev, University of Regina, SK, Canada

1:45 PM **Physics Section Meeting**

Physics Poster Presentations

U P419 Effects of noise on phase transition
Eurydice Kanimba*, Michael NkainmbiBello, and Raul Hazel, Midwestern State University, Wichita Falls, TX.

G P531 Improving photovoltaic cell power utilizing quantum coherence
Marlan Scully, Texas A&M University, Princeton University, Baylor University, Anatoly Svidzinsky, Texas A&M University, Justin Highland*, Physics Department, Texas A&M University

G P501 Interference of signal and background in surface-enhanced CARS spectroscopy
Charles W. Ballmann*[1], Dmitri V. Voronine[1,2], Alexander M. Sinyukov[1], Xia Hua[1], Alexei V. Sokolov[1], and Marlan O. Scully[1,2,3] (1)Texas A&M University, College Station, TX 77843 (2)Princeton University, Princeton, NJ 08544 (3)Baylor University, Waco, TX 76798

G P550 Magnetic properties of a long, thin-walled ferromagnetic nanotube
Chen Sun*, Valery Pokrovsky, Texas A&M University, College Station, TX

U P424 Measurments of the interplay between the Néel and Brown Superspin Relaxation Times in Fe_3O_4/Hexane Magnetic Fluids
Joshua L. Morris*, Michael Eastman, Cristian E. Botez

G P379 Proposal for a random Raman laser

Brett H. Hokr*, Vladislav V. Yakovlev, Georgi I. Petrov, Texas A&M University, College Station, TX and Benjamin Rockwell, Hope Beier, Air Force Research Labs, Ft. Sam Houston, TX and Gary Noojin, TASC Inc., San Antonio, TX and Leonid A. Golovan, Lomonosov Moscow State Univeristy, Moscow

G P442 Pulse shaping filaments in a liquid

Jonathan Thompson*, Matt Springer, Andrew Traverso, Alexei Sokolov, Texas A&M University, College Station, TX, and Marlan Scully, Texas A&M University, College Station, TX, Princeton Unversity, Princeton, NJ, and Baylor University, Waco, TX

Science Education Section - Weir 006

8:15 AM **Science Education Symposium**

8:15 AM NS 620 International Astronomical Search Collaboration: Original Discoveries of Main Belt Asteroids by High School & College Students

Patrick Miller Hardin-Simmons University, Denise Rothrock Madisonville High School

9:15 AM NS 621 Teaching Environmental Science in the Three Rivers' Air & Watersheds

James Westgate, Lamar University

9:45 AM NS 622 Ecology Field Academy for Secondary Science Teachers

Zane Laws, Cisco College, Abilene Education Center

10:15 AM **Morning Break**

10:30 AM **Science Education Symposium (Cont.)**

10:30 AM NS 623 Improving teaching strategies in big classrooms. How do we get students actively involved in the learning process?

Manuela Gardner, Texas A&M – Corpus Christi

11:00 AM NS 624 Natural Resources and Environmental Literacy Plan for Texas: Strategies on getting the hearts and minds of the next generation informed on land, water, climate and ecosystems.

Thomas L. Arsuffi, Texas Tech University; Christine Mosely, University Texas at San Antonio; Nancy Herron, Texas Parks and Wildlife Department

12:00 PM **Lunch**

Science Education Oral Presentations

1:00 PM NS 310 Crop & Animal Research Experience (CARE) for undergraduates at Texas A&M University: an example of a successful Research Experience for Undergraduates (REU) in the Biological Sciences

Craig Wilson, Ph.D., USDA/Hispanic Serving Institutions National Program (HSINP) & Texas A&M University, College Station

1:15 PM NS 354 Survivor, Sixteen, and the Nine-Card trick

Dr. Stefan T. Mecay, Schreiner University, Kerrville, TX

1:30 PM U 546 Teaching with intent

Paula Noe, Austin ISD

1:45 PM NS 596 Mapping the STAAR

Dr. Barbara ten Brink

2:00 PM NS 601 Developing and conducting a hands-on assessment of biology lab skills and safety

Cathleen N. Early*, Karen Grant, Gregory D. Frederick, Arch Koontz, Andrew W. Woodward, and Kathleen Wood, University of Mary Hardin-Baylor, Belton, TX.

2:15 PM U 606 The new college algebra and how I teach it

Dr. John T. Sieben, Texas Lutheran University

2:30 PM **Afternoon Break**

3:00 PM G 616 Safety in Texas secondary science classrooms: 1990-2007
Lisa Kennedy and Sandra West, Texas State University, San Marcos, TX.

3:15 PM G 617 Chinese precollege education: a student's perspective
Yutian Yu

3:30 PM NS 618 STEM education: efficacy of integrating science and math
Sandra West, Texas State University, San Marcos, TX, and Sandra Browning, University of Houston at Clear Lake, Houston, TX.

3:45 PM NS 619 Case study of math teacher's pathway to conceptual teaching
Sandra Browning, University of Houston at Clear Lake, Houston, TX, Sandra West, Texas State University, San Marcos, TX, and Laura Schlichting, North East ISD, San Antonio, TX.

4:00 PM **Science Education Section Meeting**

Science Education Poster Presentation

NS P328 TxKORP outreach: K-16 student engagement in geosciences
Kevin W. Stafford, Melinda G. Shaw, Wesley A. Brown, Department of Geology, Stephen F. Austin State University, Nacogdoches, TX

Systematics and Evolutionary Biology Section - Weir 120

Oral Presentations

8:30 AM G 519 Phylogenetic relationships of southern African rodents of the genus *Gerbilliscus* (Muridae: Gerbillinae)
Molly M. McDonough* and Robert J. Baker, Texas Tech University, Lubbock, TX and Josef Bryja, Institute of Vertebrate Biology, Czech Republic and Kris Helgen, Smithsonian Institution, Washington DC and Duane Schlitter, Texas A&M Colllege Station, TX

8:45 AM G 520 Phylogeography of the American Hog-nosed Skunk, *Conepatus leuconotus* (Lichtenstein, 1832)
Adam W. Ferguson*, Richard E. Strauss, Texas Tech University, Lubbock, TX, A. Townsend Peterson, University of Kansas, Lawrence, KS, and Robert C. Dowler, Angelo State University, San Angelo, TX

9:00 AM G 396 Karyotype of *Peromyscus grandis* (Rodentia: Cricetidae) and comments concerning its phylogenetic affinity
Nicté Ordóñez-Garza*, Department of Biological Sciences, Texas Tech University, Lubbock TX 79409, Vicky J. Swier, Biomedical Sciences Department, Creighton University, Omaha NE 68178, John D. Hanson, Research and Testing Laboratory, 1004 Garfield Dr. building #340, Lubbock, TX 79416, Robert D. Bradley, Department of Biological Sciences, Texas Tech University, Lubbock, TX 79409, and Natural Science Research Laboratory, Museum of Texas Tech University, Lubbock, TX 79409

9:15 AM G 393 The utility of the zonadhesin protein as a potential isolating mechanism in three pairs of rodent species
Emma K. Roberts*, Robert D. Bradley, Texas Tech University, Lubbock, TX and Daniel M. Hardy, Texas Tech University Health Sciences Center, Lubbock, TX.

9:30 AM G 560 Dynamics of hybridization between two species of woodrats (genus *Neotoma)*
Matthew R. Mauldin*, Robert J. Baker, Robert D. Bradley, Texas Tech University, Lubbock TX, J. Delton Hanson Research and Testing Facility, Lubbock, TX and Michelle L. Haynie, University of Central Oklahoma, Edmond, OK

9:45 AM **Morning Break**

10:15 AM G 480 An analysis of the distribution and diversity of Thaumarchaeota within the springs and soils of the northwestern Chihuahuan Desert
Laura Tang* and Jackie Denson, Sul Ross State University, Alpine, TX.

10:30 AM U 587 A re-examination of the paratypic series of the fossil land snail *Lysinoe breedlovei* (Gastropoda:Pulmonata) of West Texas using X-ray Computed Tomography.

Mary Jones*, Ned E. Strenth, Angelo State University, San Angelo, TX and Alfonso Correa-Sandoval, Instituto Technológico de Cd. Victoria, Tamaulipas, Mexico

10:45 AM U 425 Comparative morphology of the pectoral girdle and forelimb of a phytosaur
Hornung, K. and Stocker, M. R., The University of Texas at Austin, Austin, TX

11:00 AM G 374 Spatial and temporal shifts in Paleogene crocodyliform diversity and a new globidont alligatoroid from the Middle Eocene of West Texas
Michelle R. Stocker, The University of Texas at Austin, Austin, TX, Christopher A. Brochu, University of Iowa, Iowa City, IA, and E. Christopher Kirk, The University of Texas at Austin, Austin, TX

11:15 AM G 434 The earliest record of *Cordylus* from continental Africa
Alicia M. Kennedy*,The University of Texas at Austin, Austin, TX, Patrick J. Lewis, Sam Houston State University, Huntsville, Texas, and Darryl J. deRuiter, Texas A&M University, College Station, Texas

11:30 AM **Systematics and Evolutionary Biology Section Meeting**

11:45 AM **Lunch**

1:00 PM G 441 Recombination without sex: Quantifying genome dynamics in an asexual lizard
Alex Hall, The University of Texas at Arlington, Arlington, TX

1:15 PM U 316 Female fitness as a function of stored sperm in the livebearing western mosquitofish, *Gambusia affinis*
Gretchen E. Kroh* and Raelynn Deaton, St. Edward's University, Austin, TX

1:30 PM U 472 Social Dominance hierarchies in two liverbearing fishes with different mating strategies.
Zachary Steele*, Paula Deaton, St. Edwards University, Austin, TX

1:45 PM U 533 Effects of competitor size ratio on male aggression and mating in the coercive livebearing western mosquitofish (*Gambusia affinis)*
Hillary Evans*, Tony Voong, St. Edward's University, Jessica Sanchez, Florida International University, and Raelynn Deaton, St. Edward's University

2:00 PM U 534 Strength of male preference for female body size in three species of livebearing fishes that differ in mating strategies
Claire Hemmingway*, Malea Harrison, Zachary Schertz, Natalie Willard, St. Edward's University, Brian Boutwell, Sam Hamontree, Janalyn West, Sam Houston State University, Stacy Stoops, Texas A&M, and Raelynn Deaton, St. Edward's University

2:15 PM NS 467 Comparative effects of female resistance on male mating success across three livebearing fishes
Raelynn Deaton*, St. Edwards University, Janalyn West, Sam Houston State University, Stacy Stoops, Texas A&M University

2:30 PM **Afternoon Break**

3:00 PM G 465 Developmental variation and variability in the ossification sequence of *Monodelphis domestica.*
Zachary Morris*, The University of Texas at Austin

3:15 PM G 375 Evaluating the evolution of plastral kinesis in Testudinoid turtles
Robert W. Burroughs, The University of Texas at Austin, Austin, TX

3:30 PM G 502 Morphometry.org: A new website to share, search for, and resample morphometric data
William B. Gelnaw: University of Texas at Austin

3:45 PM G 376 The ants of Texas
Christopher M. Wilson*, Jerry L. Cook, Sam Houston State University, Huntsville TX.

Systematics and Evolutionary Poster Presentations

U P440 A new desmatosuchine aetosaur from Potter County, Texas
Siegel, Simone M., Rembach, Jennifer, and Stocker, Michelle R., The University of Texas at Austin, Austin, TX

U P530 Coercive males alter mating behaviors according to risk of sperm competition

Julain Copado*, St. Edward's University, Brian Boutwell, Janalyn West, Sam Houston State University, and Raelynn Deaton, St. Edward's University

NS P532 Coercive males discriminate against females with which they have recently mated

Raelynn Deaton*, St. Edward's University, Clint Anders, Sam Houston State University, Jeff Goessling, Alburn University, Craig Sargent, University of Kentucky

U P586 Cranial morphology of the kalahari round-headed worm lizard (*Zygaspis quadrifons*) using high resolution X-ray Computed Tomography

Cristhian Cadena*, Alicia M. Kennedy, and Patrick Lewis. Department of Biological Sciences, Sam Houston State University and Jackson School of Geosciences, University of Texas-Austin

U P608 Do male guppies shift mating behaviors when faced with different sized competitors?

Jordan Neuman*, Hilary Evans, Tamara Fraker, Somerley Swarm, Janaee Wallace and Raelynn Deaton, St. Edwards University, Austin, TX

U P482 Effects of social dominance on male preference for female size in the guppy (*Poecilia reticulata*)

Zachary Steele*, Paula Deaton, St. Edwards University, Austin, TX

U P469 Estimation of the paleoniche of *Mentzelia thompsonii* (Loasaceae)

Jonathan Stites*, Emily Crain, Elizabeth V. Lurz, Joshua M. Brokaw, Abilene Christian University, Abilene, TX

U P365 Linking function and behavior in a coercive livebearing fish (*Gambusia affinis*)

Lan-Anh Van-Dinh*, St. Edward's University, Austin, TX, Andrea Aspbury, Texas State University, San Marcos, TX and Raelynn Deaton, St. Edward's University, Austin, TX

U P416 Maturation-dependent sperm storage in livebearing fishes

Charline Valerie Mejia*, Paula Raelynn Deaton, St.Edward's University, Austin, TX

U P400 Molecular systematics of the Ophiurodea using 16S rDNA

Alexander Hill*, Zak Kroeger, Shannon Rose, and Rebecca Hunter, Abilene Christian University, Abilene, TX

G P513 Phylogenetic relationships of five members of the family Vespertilionidae (Chiroptera) from malaysian Borneo.

Pablo R. Rodriguez Pacheco*, and Loren K. Ammerman. Angelo State University, San Angelo, TX.

U P458 Phylogentic relationships in the rodent genus *Thomasomys*

Michael Maeker*, Tanya Daughtry, Joshua M. Brokaw, J. Delton Hanson, Thomas E. Lee, Jr., Abilene Christian University, Abilene, TX and Research and Testing Laboratories, Lubbock, TX

U P366 Post-parturition females cannibalize at higher rates but do not discriminate against their own young.

Natalie Willard*, St. Edward's University, Austin, TX, Samuel Hamontree, Leanne Brown, Sarah Holguin, Sam Houston State University, Huntsville, TX, Stacy Stoops, Texas A&M, Zachary Schertz, and Raelynn Deaton, St. Edward's University, Austin, TX

U P561 Preliminary anaylsis of the cranium of *Gekko gecko* using high resolution X-ray Computed Tomography (HRXCT)

Aurelia Mapps*, Cristhian Cadena, Patrick Lewis, Sam Houston State University, Huntsville, TX

G P437 Preliminary results of a total evidence approach to resolving *Peromyscus*

Megan S. Corley-Keith*, Texas Tech University, Lubbock, TX, Roy N. Platt, Mississippi State University, Mississippi State, MS, and Robert D. Bradley, Texas Tech University, Lubbock, TX

Terrestrial Ecology and Management Section - Weir 211

Oral Presentations

8:15 AM **Tribute to Alfred Russel Wallace by Richard Patrock**

8:30 AM U 466 Results of a Mammal Survey of the Otonga Nature Reserve, Ecuador

Thomas E. Lee, Jr., F. Grayson Allred*, Andrew Hennecke, Nicolas Tinoco, Abilene Christian University, Abilene, TX

8:45 AM U 524 Defense mechanisms and predatory awareness response of the eastern fox squirrel *Sciurus niger*

R. David Minatra, The University of Texas, Austin, TX

9:00 AM G 368 Habitat determination and genetics of the gulf coast kangaroo rat (*Dipodomys compactus*) in northern Kenedy county, Texas
Ryan T. Burgard and Jon A. Baskin, Texas A&M University- Kingsville, Kingsville, TX.

9:15 AM G 541 Genetic structure of an urban population of striped skunks
Wesley A. Brashear*, Loren K. Ammerman, Robert C. Dowler

9:30 AM G 517 The terrestrial and arboreal hide box selection of North American rat snakes (*Scotophis spp.*)
Jerrod G. Tynes* and Lani Lyman-Henley, Texas A&M University Commerce, Commerce, TX.

9:45 AM **Morning Break**

10:15 AM U 584 Microhabitat Use by an Urban Population of Water Snakes
Jacob Owen*, Texas State University, San Marcos, Tx, Nagendra Pokala and Travis LaDuc, University of Texas, Austin, Tx.

10:30 AM U 580 Metagenomic characterization of the karst soil microbial communities characteristic of habitats for black-capped vireos at Wild Basin (Travis Co., TX)
Caitlin Cognian*, Joanna Pulido, Erik Escobar, Mohammad Abu-Esba, Monica Swartz, Charles Hauser, St. Edward's University, Austin TX 78704

10:45 AM NS 320 Mexican rice borer (Lepidoptera: Crambidae) host plant preferences and underlying nutritional associations
Allan T. Showler and Thomas E. Reagan

11:00 AM NS 403 Status of the tamarisk leaf beetle *(Diorhabda* spp.) as a saltcedar (*Tamarix*) biocontrol agent along the Rio Grande River in Presidio County and its impact on a non-target species, *Tamarix aphylla*
Anne Marie Hilscher* and Christopher M. Ritzi, Sul Ross State University, Alpine, TX

11:15 AM NS 382 Interactions of *Grassiella wheeleri* (Escherich 1905) with *Solenopsis invicta* Buren
Kara McLelland, Chris Hamm and Robert Baldridge*, Baylor University, Waco, TX

11:30 AM **Lunch**

1:00 PM G 397 Influence of fire on and succession of microbial communities after disturbance in Marfa grasslands
Masahiro Ohnishi*, Bonnie J. Warnock, Jackie Denson, Louis Harveson, Borderlands Research Institute, Sul Ross State University, TX 79832,

1:15 PM G 322 Compensatory growth in southern mule deer
Daniel M. Wolcott*, Floyd W. Weckerly, Texas State University, San Marcos, TX and Jim Asmus, AC/S Environmental Security, Camp Pendleton, CA

1:30 PM G 336 Temporal variations in rumen-reticulum fill, micro-organism abundance and absorptive capacity in southern white-tailed deer
Ryan S. Luna, Dittmar Hahn, and Floyd W. Weckerly, Texas State University

1:45 PM NS 590 A national melting plot: introduced and native plant Beta diversity patterns across the United States
Richard J.W. Patrock

2:15 PM **Terrestrial Ecology and Management Section Meeting**

Terrestrial Ecology and Management Poster Presentations

G P604 A comparison of the ectoparasitic fauna of *Peromyscus* and *Heteromys* genera between Presidio County, Texas and La Tigra and Cusuco National Park in Honduras
Lizbeth Marquez and Christopher Ritzi

U P449 Climate niche comparative analysis of *Vulpes velox* and *Vulpes macrotis*
Aubrey G. Palmer and Joshua M. Brokaw, Department of Biology, Abilene Christian University, Abilene, Texas 79699-7868

U P581 Metagenomic characterization of the soils and microbial communities characteristic of habitats for black-capped vireos at Wild Basin Wilderness Preserve

Joanna Pulido*, Caitlin Cognian, Erik Escobar, Mohammad Abu-Esba, Monica Swartz, Charles Hauser, St. Edward's University, Austin TX 78704

U P588 Nest site characteristics of Mourning Dove and Eurasian Collared-dove nests in an urban environment

Brittnay Deanne Walton* and Andrew C. Kasner, Wayland Baptist University, Plainview, TX

NS P350 Rapid spread of *Balclutha rubrostriata* (Hemiptera: Cicadellidae) in Texas and southwestern Louisiana, USA and associated host plants

Ashley R. Morgan*, Autumn J. Smoth-Herron and Jerry L. Cook, Institute for the Study of Invasive Species, Texas Research Institute for Environmental Sciences and Sam Houston State University, Huntsville, TX.

U P311 The effect of habitat restoration for the black-capped vireo on ant diversity at the Wild Basin Wilderness Preserve

Diego Aguilar*, Amara Garza*, Allan Hook, St. Edward's University, Austin, TX

U P593 Towards a Novel Engineered Solution for the Quantification and Modeling of Predator-Prey Interactions in a Captive Terrestrial Environment

Joseph Falade, Jared Fadow, Dale McDonald, Michael Shipley, Midwestern State University

Abstracts

312 **Anthropology**

A Late to terminal classic household in the shadows of the ancestors: A View from Group E, Xunantunich

Catherine Sword, University of Texas at San Antonio

As a member of the Mopan Valley;Preclassic Project, I conducted investigations at the Group E structure within the site of Xunantunich in order to understand the development of political authority during the Preclassic period in the Mopan River Valley, Belize. Excavations at Structure E-3 during the 2009 and 2012 field seasons exposed evidence of reoccupation during the Late Classic with evidence of Postclassic use. Excavations of Structure E-3 furthered investigated the form, function, and chronology of the structure in order to provide a better understanding of Group E's role at Xunantunich. Associated with this period of re-occupation are limited construction, craft production, and ritual activity in several areas of the site, including Structure E-3.

P341 **Anthropology**

The Archaeology of Peaceable Kingdom Farm, Washington County, Texas

Rhiana D. Casias*, Kennedy Huckobey, Maci Gregg, Kelsey Androit, Texas Tech University, Lubbock, TX

Peaceable Kingdom Farm (PKF) is a 250-acre private property situated within the Brazos River drainage basin in Washington County, Texas. Located approximately four miles from the Washington-on-the-Brazos State Historic Site, this property has experienced a broad and colorful history, which includes an Original 300 Texas colonist, an African-American colony, and a 1970's school for self-sustained living. In the summer of 2012 the Texas Tech University Historic Archaeological Field School launched a full-scale pedestrian survey of PKF to compose a cultural inventory of all prehistoric and historic sites, as well as revisit previously documented archaeological sites. Evidence of two prehistoric camp sites, probable slave quarters, a turn of the century homestead, post-emancipation African-American structures, and multiple tent platforms from the 1970's school were identified through ground surface survey, shovel testing, and metal detecting. This poster is a summary of the archaeological sites documented during the 2012 pedestrian survey at PKF.

387 **Anthropology**

New evidence for the introduction of domestic stock in Southern Africa

Britt Bousman (Anthropology, Texas State University), Raymond Mauldin (Center for Archaeological Research, UTSA), Karin Scott (Pretoria, South Africa) and Garth Sampson (Anthropology, Texas State University)

Re-analysis of the Later Stone Age faunal remains from Blydefontein Rock Shelter in South Africa has led to the identification of prehistoric sheep and goat. Stable carbon isotope analysis of the bones supports these identifications. Direct radiocarbon dates on one specimen indicate that sheep were introduced into Southern Africa some 500 years before the previously accepted age for this event. The Blydefontein dates, when combined with all previous dates from the region, suggest that Khoe herders with sheep, goats, and cattle were widespread in the Eastern Karoo during the last 1000 years, but there were also pre-Khoe herders and a pre-ceramic herder occupation. This raises the possibility that domestic stock was introduced to Southern Africa by pre-Khoe herders, and that the Khoe herding society developed in place in Southern Africa and were not migrants from the north.

392 **Anthropology**

Bunny tales: Using stable isotopes from short-lived leporids to reconstruct local paleovegetation at archaeological sites.

Raymond Mauldin*, Cynthia Munoz, Robert Hard, Stephen Smith, University of Texas at San Antonio, San Antonio, Tx. and Steven Lukefahr, Texas A&M University, Kingsville, Tx.

Stable carbon and nitrogen isotopic composition of bone collagen and apatite from cottontails (*Sylvilagus* sp.) and jackrabbits (*Lepus* sp.) from prehistoric archaeological and paleontological sites can be used to reconstruct short-term, local vegetation patterns and shifts in those patterns over time. Leporids occupy small home ranges, with most animals traveling within a 500 ha. area. In the wild, leporids have short lives, with most dying within the first two years of life. They feed on a wide variety of vegetation types. In addition, recent experimental feeding studies demonstrate that high bone turnover rates are present in isotopic values, with dietary shifts clearly visible in both collagen and apatite values as diets change. These characteristics suggest that leporid bone values provide high-resolution vegetation signatures, with changes in those values reflecting changes in vegetation. We review methodological considerations in the application of the approach to vegetation reconstruction, and provide a number of examples from dated archaeological sites located throughout Texas.

P399 **Anthropology**

Digging hippie archaeology in the Lone Star State

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In 2012, Texas Tech University conducted arcaheological excavations at Peaceable Kingdom Farm, in Washington, Texas. The 300-acre property was part of land owned in 1824 by one of Stephen F. Austin's 300 original colonists, William S. Brown. Later the property was sold to John D. McAdoo, who operated a plantation there in the 1850s. After emancipation, tenant farmers occupied the property until the 1960s and 70s when the property then served as a Hippie colony known as Peaceable Kingdom. Excavations of a large cistern near the original plantation house revealed the majority of the cultural material inside originated form the Hippie era and reflects commune life along with other unique aspects of the counter-culture movement that swept across the U.S. in the 1960s. The cistern offers a juxtaposition of 1960s counter-culture philosophy against the actual cultural material found. This poster will discuss the findings from the cistern and address the potential information discerned from this feature.

406 **Anthropology**

Examining the case for wattle and daub prehistoric structures on the San Antonio River, Bexar County, Texas

Stephen Smith and Steve Tomka-University of Texas at San Antonio, San Antonio Texas

Recent archaeological projects conducted along the upper reaches of the San Antonio River in Central Texas have turned up several intriguing burned clay features. Radiocarbon dated to as early as 6000 BP, the features consist of concentrations of burned clay chunks, many of which have clear impressions of sticks, poles, and other organics. Evidence of prehistoric structures is not common in South-Central Texas. Yet, it has been suggested that these features reflect the remnants of wattle and daub structures that burned at high temperatures, and subsequently collapsed. This study examines the evidence from three of these burned clay features that have been suggested to reflect prehistoric structures. We review previous claims for prehistoric structures in the region, and discuss relevant hunter-gatherer theory regarding mobility, land-use, and subsistence strategies to try to understand the conditions that give rise to substantial investment in structures.

P432 **Anthropology**

Within reach: The excavation of water wells

Jacob Edwards, Texas Tech University, Lubbock, TX

For archaeologists, water wells have great potential to yield large quantities of cultural materials. Often after they fall into disuse, trash is thrown into wells and accumulates over the years. Unfortunately, archaeologists are rarely able to investigate these features given the inherent danger and difficulty of excavating wells. Typically, wells must be destroyed in order to fully investigate their interior contents thus encouraging most archaeologists to avoid them all together. In an attempt to address this problem, an experimental methodology using a newly developed mechanical device to recover materials from wells at depths of over 15 meters was initiated at Texas Tech University in the fall of 2012. This ongoing research is proving that it is possible to recover significant data from these important features without compromising the integrity of the wells or endangering excavators.

P444 **Anthropology**

A forgotten home: Unraveling the history of the McAdoo plantation through archaeological and historical investigations.

Heather Fischer, Krystle Kelley, David Hacker, Elizabeth Martinez Texas Tech University

In the mid- 19th century General John David McAdoo operated a plantation in Washington County, Texas. McAdoo spent the early years of his professional and political life living on the plantation and eventually became a successful lawyer and military figure. Notably, he was a general in the Texas state troops and a member of the Texas Supreme Court. Today, little remains of the plantation and historical records are scarce. Archaeological excavations of the foundations of what may be the main plantation house during the 2012 Texas Tech Field School are provided information about the house's history and its relationship to the McAdoo Plantation. The investigations resulted in an extensive collection of artifacts and spatial data. Preliminary analyses of both the archaeological and historical data suggest discrepancies between the data sets. By comparing and contrasting the archaeological data with the historical information the architecture and history of the McAdoo plantation main house is better understood. This paper will demonstrate how historical records are used in conjunction with archaeological data to define a structure and its history.

453 **Anthropology**

Analysis of the lithic debitage from the older-than-Clovis stratigraphic levels of the Gault Site, Texas

Jennifer Gandy, Texas State University, San Marcos TX

For years, Clovis cultural evidence (dating to about 13,500-13,000 years ago) was believed to represent the oldest culture in the Americas. More recently, evidence has been found at archaeological sites in North and South America that pre-dates Clovis, thereby potentially representing a “pre-Clovis” culture or cultures. In Texas, the Gault Site, well-known for stratified evidence of cultures dating from Clovis to the Late Prehistoric, has produced evidence of cultural materials located in stratigraphic levels below known Clovis levels. The majority of materials unearthed from these “older-than-Clovis” levels has been lithic debitage, or stone flakes and debris from stone tool-making processes. Currently, the older-than-Clovis debitage is being analyzed and described (focusing on lithic flakes with identifiable platforms) in order to determine similarities or differences between this debitage and the known Clovis debitage from the site. From the results of the analysis, it will be determined whether or not the debitage represents a distinct culture older than Clovis at the Gault Site, and the implications will be explored.

468 **Anthropology**

Ecogeographic patterning and upper respiratory function of the maxillary sinus among modern humans (*Homo sapiens*)

Lauren N. Butaric, Texas A&M University, College Station, TX

Ecogeographic patterns of modern human (*Homo sapiens*) craniofacial diversity suggest that external nasal structures reflect climatic adaptations for respiratory function, but considerably less is known about internal craniofacial morphology. The maxillary sinus (MS) is thought to simply vary as a function of the nasal cavity (NC) and not contribute in respiratory function. Owing to conflicting studies, this study reinvestigated that claim by evaluating ecogeographic patterns of MS form in a large modern human sample (n=200) spanning 11 climatically-diverse regions. Pearson correlations showed individuals from colder, drier climates exhibited wider, taller, and more spherical MSs associated with narrower, taller NCs; external, versus internal, nasal dimensions more strongly correlated with climate. While differences in allometric slopes were evident between populations, a MANOVA largely failed to find signficant different in MS dimensions among the 11 samples. However, when grouped into broader categories, t-tests indicated a clearer separation between heat- and cold-adapted populations. These results suggest that while differents in MS form are only evident among broad climatically-based categories, significant differences in the relative relationships between the MS and NC are apparent among precise geographic regions. Further, inferior NC dimensions do not strongly follow environmental pressures, calling into question its role in respiratory function and reasons for its constraints on MS form. Finally, these results highlight the continued importance of examining the interaction between the MS and NC to understand how these internal structures vary among modern humans in relation to diverse environments and how they ultimately work together in respiratory functions.

486 **Anthropology**

A stable isotope analysis of hunter-gatherers from Hitzfelder Cave, Texas

Cynthia Munoz*, Jennifer L. Z. Rice, Kirsten Verostick, Robert Hard, and Raymond Mauldin- University of Texas at San Antonio, San Antonio, Tx.

We present the results of a stable carbon (δ13C-collagen, δ13C-carbonate) and nitrogen (δ15N) isotopic analysis of 20 individuals from Hitzfelder Cave, a vertical shaft site excavated in the 1960s in Central Texas. Direct AMS dating of ulnas from the individuals show a corrected, calibrated date range of approximately 4477 to 469 years BP, with most individuals (n=15) dating to the Late Archaic (4000-1250 years BP). The remaining burials date to the Middle Archaic (6000-4000 years BP; n=4) and the Terminal Late Prehistoric (700-400 years BP; n=1). The isotopic shifts identified in our analysis provide a detailed look at diet. At the close of the Middle Archaic diets were primarily dependent on C3 resources, including C3 fauna (e.g., deer). Diets in the Initial Late Archaic show more variation and a slight increase in overall C4 consumption, possibly including C4 fauna (e.g., bison). The Terminal Late Archaic resembles the pattern seen at the close of the Middle Archaic, with a strong dependence on C3 resources and C3 fauna. The single Late Prehistoric burial (515-320 BP) differs significantly with a strong overall C4 signature and little or no dependence on C3 fauna. The nitrogen (δ15N) value for this Late Prehistoric individual is also elevated, suggesting a drastically different diet when compared to earlier Hitzfelder interments. The stable carbon and nitrogen isotopic pattern at Hitzfelder Cave is distinct from those shown previously in the region (i.e. a trend of increasing C3 plant dependence) suggesting that substantial subsistence diversity characterized the Central Texas Archaic.

P493 **Anthropology**

A dental anomaly in a Pre-Inca population of Ecuador

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Archaeological excavations at Tajamar, Ecuador revealed 64 burial features (*tumbas*) that contain the skeletal remains of at least 72 individuals that date from the Integration Period, 500 A.D. to 1500 A.D. The remains were analyzed in order to gather demographic, morphological, and pathological information of the sample. Most remains are fragmentary and incomplete and are most likely from secondary or bundle burials, although a few individuals are mostly complete and in fair condition. Two middle-aged adults exhibit a curious dental condition that appears to be intentional dental modification; however this could be interpreted as dental trauma. The condition of the first individual (Burial 10) appears to be consistent with intentional dental modification as it is bilateral and symmetrical, with the lower first premolars individually affected. Both teeth have right-angled sections absent from the buccal surface of the crown. A second individual (Burial 31) has a similar condition but the affected tooth is a maxillary premolar with a right-angled section absent from the lingual surface. Because intentional dental modification usually involves the upper and lower incisors and canines, a definitive diagnosis of the condition is difficult to establish. Possible causes of the anomaly are discussed here.

521 **Anthropology**

The Daka calvaria and implications for *Homo erectus* taxonomy

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The geographic distribution of the *Homo erectus* taxon and its potential restriction to the Asian continent represents a long-standing debate in paleoanthropology. The Daka calvaria (BOU-VP-2/66) recovered from the Dakanihylo member of the Bouri Formation, Middle Awash, Ethiopia and dated to approximately 1.0 Myr is a pivotal specimen in this discussion. Daka is characterized by morphological features found in both African *H. ergaster* and Asian *H. erectus* fossils, including a suite of traits described as uniquely derived in Asian *H. erectus*. As such, Daka raises the question of whether *H. ergaster* and *H. erectus* are biologically distinct clades or instead represent a wide-spread, morphologically diverse paleodeme. Daka's critical role in human evolutionary theory, and the genus *Homo* in particular, has not yet been fully explored through quantitative methods. A craniometric analysis of the calvaria aimed at examining its morphological similarities with *H. ergaster* and *H. erectus* fossils is currently lacking. As a preliminary step towards addressing this gap, discriminant function analysis using linear cranial measurements was conducted. The comparative sample was comprised of crania commonly designated as *H. ergaster* and/or *H. erectus* and recovered from fossil localities throughout the Old World. The results of this analysis indicate that Daka is most morphologically similar to Asian *H. erectus* fossils. Further, our findings suggest that there is no clear separation between the *H. ergaster* and *H. erectus* crania. As such, the species-level division between African and Asian *H. erectus* may not be taxonomically meaningful.

527 **Anthropology**

Activity-related changes to the patella among Native American groups

Maggie McClain, Texas State University-San Marcos

This study explores modifications to the patella due to activity patterns among six archaeological skeletal populations engaged in different subsistence regimes. Musculoskeletal stress markers (MSMs) result from mechanical stress, and certain activities may result in modification of articular surfaces. Given the location of the patella in the knee joint and attachment sites of the quadriceps and tibia tendons, changes in this bone may reflect muscle development and joint degeneration from activities involving the lower extremities. The samples for this study were drawn from Archaic and Late Prehistoric mobile hunter-gatherers from Texas; Archaic sedentary hunter-gatherers, Late Woodland agriculturalists, and Late Mississippian agriculturalists from Tennessee; and historic Arikara semi-sedentary horticulturalists from South Dakota. The data collected were compared to address the following questions: 1) are there differences in activities that alter the patella; 2) are there differences in patellar modification within populations; 3) can patterns be detected between populations engaged in different subsistence regimes; and 4) can these patterns be used as population markers to predict activities, subsistence practices, or even division of labor? The results of this analysis indicate that different activities result in unique signatures of MSMs and articular surface changes, that there is significant patterning in these changes both within and between groups, and that analysis of these changes can provide valuable information on prehistoric lifeways. The ability to identify activity patterns via a single skeletal element may prove useful in archaeological cases of commingled, unprovenienced, or poorly preserved/highly fragmented remains, and may have forensic applications.

545 **Anthropology**

A survey of the frequency of supernumerary teeth in non-human hominids

Timothy L. Campbell, Department of Anthropology, Texas A&M University

Supernumerary teeth have been reported in a wide range of fossil primate taxa including Eocene adapoids, Plio-Pleistocene hominins, and other non-human hominids. In modern humans, a review of the literature shows that polydontia is less common than agenesis, more frequent in males than in females, and generally occurs at frequencies of less than 5%. In extant non-human hominids, percent incidence of supernumerary teeth varies, with the overall pattern usually documented as*Pongo* > *Gorilla* > *Pan.* Within the genus *Pongo*, percent incidence reported generally ranges between 6 to 20%. In a published study on hybridization in a captive baboon population comprised of two closely related species a high incidence (44%) of supernumerary molars was reported in F_1 hybrid males. Along with similar results documented in a study on hybridization between gorillas, these studies suggest that high frequencies of additional molars within a population may indicate hybridization. For the present study, a survey of specimens held at the Cleveland Museum of Natural History, the American Museum of Natural History, and the Smithsonian National Museum of Natural History revealed the pattern of incidence of supernumerary molars in non-human hominid skulls examined to be 7.1, 4.7, and 1.2% for *Pongo*, *Gorilla*, and *Pan*, respectively. The high incidence of supernumerary molars as evidence for possible hybridization in *Pongo* is considered here, along with divergence date estimates, population genetics and biogeography. Finially, a method to test if the high incidence of supernumerary molars in *Pongo* is associated with hybrid individuals is proposed.

P612 **Anthropology**

Epistemology and synthesis: Instrumental neutron activation analysis and the Caddo tradition

Robert Z. Selden Jr., Department of Anthropology, Texas A&M University and Center for Regional Heritage Research, Stephen F. Austin State University

The statistical groups illustrated in this poster represent the current iteration of Caddo INAA groupings based upon the geochemical composition of archaeological ceramics. These replace the previous groupings, which were found to be lacking in interpretive power. This poster represents the initial step toward the reanalysis of the geochemical groups, and the incorporation of GIS as a statistical companion within the archaeological toolkit for analyzing the results of INAA.

P613 **Anthropology**

The East Texas Caddo: Modeling tempo and place

Robert Z. Selden Jr.; Department of Anthropology, Texas A&M University and Center for Regional Heritage Research, Stephen F. Austin State University; Timothy K. Perttula; Archeological and Environmental Consultants, LLC

>Analysis of the Caddo sample (n=889 dates) from the East Texas radiocarbon database is used to establish the tempo and place of Caddo era (ca. A.D. 800-1680) archaeological sites, site clusters, and communities across the region. The temporal and spatial distribution of radiocarbon ages from settlements, mound centers, and cemeteries across the region have utility in exploring the development and geographical continuity of the Caddo peoples; establishing the specific times when areas were abandoned or population sizes diminished; and defining times and areas illustrating an intensification in mound center construction and large cemeteries became a focus of community social practices.

P614 **Anthropology**

Ceramic Petrofacies: Modeling the Angelina River Basin in East Texas

Robert Z. Selden Jr.; Department of Anthropology, Texas A&M University and Center for Regional Heritage Research, Stephen F. Austin State University

Ceramic provenance studies remain the basis of worldwide archaeological research concerned with reconstructing exchange networks, tracing migrations, and informing upon ceramic economy. Unfortunately, Texas archaeologists have been plagued with an inability to trace ceramic production sources to the same extent as researchers within other regions. Ceramic petrofacies models have been employed successfully in archaeological contexts at the San Pedro Valley, Tonto basin, Tucson basin, Agua Fria, and Gila and Phoenix basins in Arizona, but have not yet been employed east of Arizona. Data resulting from the construction of an actualistic petrofacies model in the prehistoric coastal environment of East Texas could provide the necessary foundation for archaeologists to begin expanding upon the current dialogue regarding the provenance of ceramic vessels utilized by precolonial Woodland and Caddo populations.

P307 **Biomedical**

Locating genes responsible for -*N*-acetylglucosamine catabolism by *Pseudomonas aeruginosa*, a prominent respiratory pathogen in cystic fibrosis patients

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Cystic fibrosis (CF) is a congenital disease, the chief symptom of which is a defect in the mucus membranes in some areas of the body. As a result, patients with CF accumulate copious amounts of a thick, sticky fluid in their respiratory tract that reduces the ability to clear bacterial infections in the lungs. The accumulated mucus serves as a source of nutrition for bacteria, allowing them to establish long-term, chronic infections within the lungs of the CF patient. Although many bacterial species can infect the CF lung, the opportunistic pathogen *Pseudomonas aeruginosa* emerges as the dominant bacterium over time.*P. aeruginosa* grows in the form of biofilms within the lung making eradication of this bacterium difficult. These infections are the leading cause of death in CF patients due to resulting complications such as pneumonia. Indeed, 90% of deaths due to cystic fibrosis are caused, at least in part, by *P. aeruginosa.* Previous analysis of the nutritional components in CF sputum has revealed the presence of multiple amino acids, sugars, and ions including the monosaccharide *N*-acetylglucosamine (GlcNAc). GlcNAc can serve as a carbon source for *P. aeruginosa* and the GlcNAc catabolism operon (*nag*operon) in this bacterium has been identified. The *nag*operon consists of five genes, of which one encodes a regulator, two code for enzymes required for GlcNAc catabolism, and two encode a GlcNAc-specific transporter. Surprisingly, a mutant lacking the two catabolism enzymes was found to be able to utilize GlcNAc as the sole source of carbon and energy, indicating there are genes outside of

the operon involved in GlcNAc catabolism. This study aimed to identify the genes outside of the *nag* operon that enable the catabolism of GlcNAc. To identify these genes, transposon mutagenesis was performed on the strain lacking the *nag* operon. Thousands of mutants were generated with over one thousand of them having been screened using the GlcNAc catabolism assay. Assays continue to be run on new mutants. These are the important preliminary steps to discovering more about the metabolism of *P. aeruginosa*, specifically in relation to CF patients. Once all of the genes responsible for catabolism of GlcNAc are located, more light can be shed on the difficult task of treating *P. aeruginosa* infections.

P309 **Biomedical**

Patterns of fMRI hippocampal lamellar activation induced by Perforant Path stimulation in the Kainic Acid rat model of Epilepsy

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Rationale: The hippocampus is organized into a sausage-like structure of several thin transverse slices containing tri-synaptic circuitry, also known as the lamellar organization. Our lab has been interested in the functional rearrangement of epileptic hippocampal circuitry in models and humans with intractable temporal lobe epilepsy. Using anatomical techniques, we demonstrated seizure-induced sprouting interconnecting adjacent hippocampal lamellas in several epileptic models (Cavazos et al, 2004, 2006). More recently, using physiological techniques, we showed translamellar hippocampal hyperexcitability in the Kainic Acid–Status Epilepticus (KA-SE) model. Our studies have shown that seizure-induced sprouting has a latent period followed by progressive and permanent aberrant interconnectivity between hippocampal lamellas, which precedes occurrence of spontaneous seizures of increasing frequency. We extend these observations using functional MRI (fMRI)-BOLD analysis from perforant path (PP) stimulation examining translamellar hyperexcitability in repeated observations in the same KA-SE animal.

Methods: Sprague Dawley male rats (200g) were anesthetized (1.5% Isoflurane) and prepared for electrode implantation with a MRI compatible bipolar electrode lowered into PP (-8.0mm,4.2 mm,3.5 mm). Electrodes were anchored with 4 nylon screws and dental cement. Rats had 7 day postsurgical recovery and given analgesics and topical antibiotics. fMRI experiments were performed on a Bruker Biospec 11.7T scanner with surface coil. T2 weighted spin echo images were obtained using rapid acquisition relaxation enhanced (RARE) and echo planar imaging (EPI) sequences. Baseline fMRI scan was triggered by hippocampal stimulation with a stimulation block of 7 trains with 10 sec stimulation and 50 sec rest per train. The block was repeated at 2.5, 5, 10, and 20 Hz with 1.0mA current. Images were saved and analyzed with Stimulate software. Kainic Acid (KA), 5mg/kg i.p. every 1 hr (x3) was injected into rats. They were observed for 5 hrs post-KA to verify status epilepticus (SE). Only rats with SE for 30+ min were used in study. Rats were re-scanned at 7, 21, 60, and 90 days after KA-SE.

Results: Ten rats were implanted and are undergoing experimentation. At baseline scans, PP stimulation induced BOLD response signal was observed at 5, 10 and 20 Hz in a 2-4 mm region of the dorsal hippocampus. At 7 days after KA-SE, during the latency period, there was no additional BOLD response recruitment in hippocampal lamellas above or below the initial activation observed in the baseline fMRI scans.

Conclusion: PP stimulation is able to trigger a pattern of hippocampal lamellar fMRI activation. At 7 days after KA-SE, no translamellar hyperexcitability was observed in agreement with previously described anatomical and physiological observations of a latency period. Patterns of fMRI hippocampal activation might be useful neuroimaging surrogate markers that might help define phenomenon of translamellar sprouting, a potential mechanism for epileptogenesis.

330 **Biomedical**

MIF deficiency enhances the efficacy of gucocorticoid treatment in experimental autoimmune myocarditis and ameliorates the progression to dilated cardiomyopathy

*Braxton Jamison, Rebecca A. Sosa, Thomas G. Forsthuber

Myocarditis, an inflammatory condition of the heart, commonly leads to dilated cardiomyopathy (DCM) and ultimately heart failure. Acute inflammation can be suppressed by glucocorticoids (GCs), although negative side effects limit GC efficacy in myocarditis and treatment cannot stop progression to DCM. Macrophage migration inhibitory factor (MIF) is the only known proinflammatory cytokine induced by GCs that also counter-regulates their immunosuppressive effects. It remains unknown whether this counter-regulation promotes progression of myocarditis to DCM. Therefore, we investigated dexamethasone (Dex) treatment in experimental autoimmune myocarditis (EAM) and progression to DCM in MIF knockout (MIF $^{-/-}$) Balb/c mice as compared with wild-type (Wt) mice. EAM and DCM severity were determined histopathologically using H&E and Masson's Trichrome staining. The nature of infiltration in the chronic phase of disease was analyzed using immunofluorescence (IF) and quantified by flow cytometry. We found that Wt Dex-treated mice recovered from EAM after peak of disease but progressed to DCM with chronic fibrosis, whereas MIF$^{-/-}$ Dex-treated mice were highly resistant to both EAM and DCM. Quantitative analysis demonstrated a large increase in the percentage of CD4^{+} and Ly6G^{+} infiltrates as compared with naïve mice, while MIF$^{-/-}$ Dex-treated mice had similar percentages to naïve mice. IF staining showed inflammatory lesions consisting of primarily CD11b^{+} infiltrates, which were absent in the MIF$^{-/-}$ Dex-treated mice. Our results indicate that MIF antagonizes the efficacy of GCs in EAM and DCM and suggests MIF inhibition in combination with GC treatment as a potential therapeutic strategy for myocarditis as well as prevention of progression to DCM.

P362 **Biomedical**

Post mortem assessment of the Translational Age and the tibial bone marrow compartment volume of a swine model (*Sus scrofa*) used for medical research

San Antonio Military Medical Center, Cardiology Service, Department of Medicine

Background: Swine models are frequently employed in medical research to assess the benefits of drugs and medical interventions because of the similarity of their physiology to humans. However, details of animal models are frequently required to appropriately translate finding to man. Objective: Using post mortem specimens, we assessed 1) the relative physiologic age of an animal model based of tibial growth plate characteristics and 2) compared direct and calculated measures bone marrow compartment volumes. Methods: In this study six post mortem tibial specimens were obtained from three swine (*Sus scrofa, 52±4 Kg, age: 4.4± 0.4 mo*). Tibiae were longitudinally sectioned using a bone saw and bone marrow extracted and compacted into 10cc syringes. Bone marrow compartment volume was assessed by 1) direct volumetric measurements and 2) was calculated based on a cylindrical model (area*length) using minimal internal diameter and length measures between cancellous bone margins within the bone shaft. The presences of epiphyseal plates were noted proximally and distally and the length between growth plates recorded. Radiographic images were also examined and compared with growth plate changes previously reported in man. Results: Intact epiphyseal plates were present radiographically and on gross inspection. No difference was found between direct measures of bone marrow compartment volume (Mean±SD = 13.1±3.4 ml) and calculated volume (12.7±0.9 ml). Conclusions: This study suggests that 1) the swine model evaluated could be translated to an equivalent human age between mid to late adolescence and 2) tibial bone marrow compartment volumes may be approximated by a cylindrical model. Disclaimer: This research study was approved by the Institutional Animal Care and Use Committee at the US Army Institute of Surgical Research, San Antonio, TX. The views expressed in this commentary are those of the authors and do not reflect the official policy or position of the Department of the Army, Department of Defense, or the U.S. Government. The authors have no conflict of interests to disclose.

422 **Biomedical**

Temporal relationships in the progression of oxidative stress, amyloid-β accumulation, and cognitive dysfunction in the CL2355 *C. elegans* Alzheimer's disease model

Travis Peery*, Matthew Lagarde, and Fidelma O'Leary, St. Edward's University, Austin, TX

Current research into the pathogenesis of Alzheimer's disease (AD) seeks to understand the causal relationship between protein amyloid-β accumulation and oxidative stress, and whether either one acts as the primary driver of the pathological process (Zhang, et al., 2012). In this project we examined the temporal relationship between the progression of cognitive decline, the level of reactive oxidative species (ROS), and amyloid-β plaque formation in the *C. elegans* AD model, strain CL2355. *C. elegans* CL2355 and wild type control (N2) were cultured at 23°C on solid agar medium seeded with *E. coli* OP-50. Populations were synchronized by dissolution in 20% alkaline hypochlorite solution to which eggs are resistant (Stiernagle, 2006). Eggs were then raised on media made with 40mM FLD-U, an egg laying inhibitor, to suppress the production of progeny (Sanda, et al., 2011). ROS species were assayed at five ages across the lifespan using 2',7'-dichlorfluorescein-diacetate (DCFH-DA) fluorescent measurement(Wu, et al., 2006). ROS levels increase with age across both CL2355 and N2 control strains; however, preliminary data suggests that ROS accumulation in CL2355 proceeds at a much greater rate, beginning with ROS levels 25% greater than N2 at day three of the life cycle and by day nine reaching levels 1000% greater than N2 of the same age. This provides a timeline for the progression of oxidative stress in the *C. elegans* AD model. Further investigation is necessary to understand the point at which significant amyloid accumulation begins and its temporal relationship to ROS levels.

P435 **Biomedical**

Photoperiodic regulation of Aquaporin-11 expression in Syrian hamster testis.

John Shannonhouse, Li An Fang, William Lucas, Scott Goddard, Edward Jones, Henryk Urbanski, Caurnel Morgan

Problems occur in men in about half of couples who seek medical help for subfertility. The present study sought to identify proximal regulators of male fertility using seasonally breeding Syrian hamsters as a model. Transition from a 14 hour per day light period (long day, LD) to 10 hours per day (short day-sensitive, SD-S) causes testicular atrophy and disruption of gonadal steroids and spermatogenesis. After 20 week in SD, testicles regain mass and begin to produce steroids and sperm (short day-refractory, SD-R). We used differential display to identify several mRNAs down regulated in SD-S. We confirmed a decrease with RT-PCR. We also confirmed decreases in several genes known to be involved in steroidogenesis or spermatogenesis. Forward stepwise selection regression analysis on RT-PCR data revealed *aquaporin-11* (*Aqp11*) was best able to predict testis mass. Knockdown of *Aqp11* by RNA interference (RNAi) caused changes in expression of several genes known to be involved in steroidogenesis or sperm function. These results provide evidence of *Aqp11*'s invovlement in sperm development.

P448 **Biomedical**

Examining the effects of brief exercise on cognitive function

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Neuronal maintenance is imperative for maintaining a healthy brain. Adequate vascular perfusion of the brain provides a steady source of oxygen and glucose, which are used to make ATP, thus facilitating both neuronal maintenance and neuronal function. Exercise increases cardiac output, and blood flow to the brain, to meet the demands of working neurons. Additionally, long-term exercise is known to stimulate several neurotransmitter systems. This study examines whether very brief periods of mild or vigorous exercise may affect cognitive function.We compared both speed and accuracy of task completion for each subject prior to exercise, immediately following exercise intervals (moderate and vigorous) and 30 minutes post vigorous exercise using Lumosity™ software. Levels of activity were determined by physiological criteria. EEG data was gathered during task performance to determine alertness levels. Our data so far indicates that after the exercise intervals, reaction time was 21% faster than baseline reaction times prior to exercise. Beta wave frequency (a hallmark of increased alertness) was increased during all post-exercise tasks, compared to baseline. This data suggests that even very brief cardiovascular exercise can bring positive benefits to the brain due to both an increase in cardiac output and an overall increase in frequency of neuronal activity. Both of these responses to exercise can facilitate increased awareness, function and motivation.

470 **Biomedical**

Biochemical and molecular identification of coagulase-negative *Staphylococcus s*pecies from university athletes.

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The appearance of methicillin resistant *Staphylococcus* has been a cause for concern in clinical and community settings. The mechanism for methicillin resistance is conferred by the mecA cassette which encodes the penicillin binding protein 2a. Recent research has pointed to the coagulase-negative staphylococcal species (CoNS) serving as a reservoir for antibiotic resistance. Therefore, nasal and pharyngeal swabs were obtained from 278 athletes and inoculated on mannitol salt agar, a selective and differential medium used to isolate *Staphylococcus* based on the organism's ability to ferment mannitol. *Staphylococcus aureus* and non-fermenting species, which are the coagulase negative staphylococcal species (CoNS), were characterized. For the purpose of this study, methicillin-resistant CoNS were identified at the biochemical level using antibiotic disk diffusion, detection of enzymatic activity, and the ability to ferment a variety of carbohydrates. In order to identify the *Staphylococcus* species at the molecular level, the rpoB gene was amplified by polymerase chain reaction (PCR) and sequenced using internal primers. Additionally, 16 of the 19 species tested have been confirmed to contain the mecA gene by PCR. *Staphylococcus* species carrying the mecA cassette may act as reservoirs for transformation of methicillin-sensitive *S. aureus* into methicillin resistant species. Therefore, the mechanism of gene transfer is also being studied. This study confirms the presence and identifies methicillin-resistant CoNS isolated from university athletes. Appearance of these antibiotic resistant species in athletes could lead to serious health issues or possibly death.

P504 **Biomedical**

Development of Parkinson's Disease symptoms and pathology following exposure to the pesticide rotenone.

Katherine Najera

Parkinson's disease (PD) is an age-related neurodegenerative disorder correlated with selective dopaminergic neuron degeneration, and the intraneuronal formation of Lewy bodies, aggregations containing alpha-synuclein protein. Lack of voluntary motor control is the earliest symptom, and PD can be fatal. PD can be genetic or sporadic. Most cases, 90-95%, are sporadic occurring when environmental and genetic factors influence disease risk (Cannon, 2009). A known environmental risk factor is the organic pesticide Rotenone, which inhibits mitochondrial complex I, causing selective damage to the nigro-striatial dopamine system (Cannon, 2009). Rotenone also promotes formation of alpha synuclein aggregations (Bove, 2003). In this study the nematode *Caenorhabditis elegans* was used to examine the progression of PD symptoms and pathology following Rotenone exposure. *C.elegans* were exposed to Rotenone (20 μM) for 72 hrs *via* their *E. coli* food source, beginning at L4 life-stage, L4+24 hours, and L4+48 hours. Following exposure, phenotypic and molecular assays were conducted. In the motility assay, thrashing was reduced by 74% in the L4 stage, 81% in L4+24, and 40% in the L4+48 life-stage. In the lifespan assay survival decreased in all groups 3 days after exposure, with 25% survival in the L4 stage, compared to 16% in L4+24, and 0% in L4+48. These data strongly suggest that the impact of Rotenone depends on the lifestage of exposure. Motility is most severely impacted in young adult worms, while lifespan is drastically impacted in older adults. This study is the first to examine an age-dependent response to Rotenone exposure.

P518 **Biomedical**

Detecting potential quorum sensing inhibitors produced by skin and oral isolates using a *Chromobacterium violaceum* indicator strain

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A biofilm is a densely packed collective of bacterial cells growing securely on a surface through the production of an extracellular matrix. Biofilm communities present a serious issue to human health due to their ability to resist antibiotics, increase bacterial virulence, and resistance to removal. A key requirement of biofilm formation is quorum sensing (QS), a chemical method of bacterial communication. Certain bacterial strains have displayed the ability to produce compounds that interrupt QS, a process called quorum sensing inhibition (QSI). In this study we hypothesized that skin and oral isolates from the human body may be capable of QSI. Bacterial strains were isolated from the skin and the surface of the bicuspid. All samples were inoculated on a range of general, selective, and differential agars to culture as many strains as possible. The isolates were subjected to 16s ribosomal RNA gene amplification, sequence analysis and then identified via BLAST (Basic Local Alignment Search Tool). Each isolate was inoculated on BHI agar, grown for 24 hours and then covered with a soft agar overlay containing *Chromobacterium violaceum.* A lack of the QS-dependent *C. violaceum* pigmentation suggests QSI. Of the nine strains tested two oral strains displayed moderate QSI- *Bacillus sonorensis* and *Rothia dentocariosa.* Future research will explore the inhibitory potential of additional isolates. Data gathered through this line of inquiry may provide means to inhibit biofilm formation *in vivo* to decrease the severity of diseases such as cystic fibrosis and chronic wound infections as an alternative or in addition to antibiotics.

P529 **Biomedical**

Do poplyphenolic antioxidant & coffee extract treatments rescue induced learning deficits in *Caernohabditis Elegans*?

Wendy Flores

Polyphenolic antioxidants are effective in reducing oxidative stress damage. Studies have revealed that these antioxidants boost neuroprotective pathways that can reduce neuronal death (Ramassamy, 2006). Previous work in this lab has shown that the pesticide Imidacloprid induces deficits in associative learning in C. elegans (Mandapat, 2009). Imidacloprid is a widely used pesticide, functioning as a neurotoxin, binding nicotinic acetylcholine receptors thereby disrupting neuronal communication. In addition, elderly worms showed the most severe pesticide-induced learning deficit, possible due to a higher background level of reactive oxidative species in older worms (Flores, 2012). We wished to determine whether polyphenolic antioxidants, and coffee extract, could offset the pesticide-induced learning deficits in elderly C. elegans. Treatment groups were given antioxidants via their E.coli food source until adult stage. The polyphenolic antioxidants tested were: resveratrol (10μM), green tea extract (100μM), and ginkgo biloba(100μM). Additional, the caffeine extract (10μg) was also tested. Upon maturity all groups were exposed to a sub-lethal dose of imidacloprid (.08 mg) for 24hrs then tested for associative thermotactic learning ability following 24hrs of training. The learning index for the control group and the experimental groups: control group: -0.77, resveratrol: 0.116, green tea extract: -0.1, ginkgo biloba:0.33 and caffeine: 0.125. The data suggests that all treatment groups improved learning ability in older worms exposed to the pesticide. The greatest reduction in learning deficits induced by imidacloprid was seen in worms cultured in Ginkgo biloba. This data suggests that a

diet rich in antioxidants may protect the nervous system from environmental insults.

P535 **Biomedical**

Development of cell therapy products: Testing cell types and specific markers

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This study investigated fluorescent DAPI staining through antibody binding by measuring the fluorescent signal to confirm the presence of endothelial/vascular cells. The isolation of the Stromal Vascular Fraction (SVF) from adipose tissue yields material rich in multipotent cells. These multipotent cells have been used in numerous research studies to repair defects in bone, cartilage, and soft tissues. A key point in moving this work from research bench to the bedside for clinical studies is the ability consistently isolate, store and retrieve the SVF in a viable state. Samples of human SVF were taken out of cryogenic storage and the cellular viability was assessed using a hemocytometer with trypan blue and 6-diamidino-2-phenylindole (DAPI) for viability assays by light and fluorescent microscopy. The SVF then underwent staining by antibodies to help identify specific cell types verifying the SVF was isolated and retrieved. The antibody binding of seven cell type markers: CD31, CD34, CD44, CD45, Siglec, ALCAM and Collagen IV. These antibodies stain endothelial/vascular cells and will bind to specific sites on stromal cells. The extracellular matrix was used to verify that the SVF was successfully recovered from cryopreservation storage. It was concluded that 44 percent of CD34 stained the endothelial/vascular cells, signifying the presence of the SVF.

P536 **Biomedical**

Examining antioxidants' abilities to alter effects of Aß expression in transgenic *C. elegans* AD model

Cullen Soares, Fidelma O'Leary, He Liu (St. Edward's University, Austin, TX)

Alzheimer's disease (AD) is correlated with the accumulation of Amyloid-Beta (Aß) into plaques within neuronal tissue. It is also correlated with increased reactive oxidative species (ROS) levels, which cause cytotoxic reactions. Antioxidants are known to be useful neuroprotective agents and reduce ROS levels. The transgenic *Caenorhabditis elegans* (*C. elegans*) AD model organism expresses human Aß and exhibits reduced chemotaxis to benzaldehyde and increased ROS levels. We examined whether antioxidants could ameliorate these conditions. The antioxidants Lipoic Acid, Resveratrol, and Reserpine were administered continuously over five days. ROS levels were assessed at 1, 3 and 5 days of treatment. On day 1 only Resveratrol reduced ROS levels. At day 3 all treatments showed reduced ROS levels (10-20% reduction relative to untreated AD), but levels were elevated by day 5 (42-69% increase). Chemotaxis index (CI) to benzaldehyde was assessed at days 3 and 5 and was reduced on both days (15-38% and 30-118% reduction, respectively). Levels of Aß mRNA (by real-time PCR) after 4 days were increased for each treatment: Reserpine= 6-fold, Lipoic Acid = 1-fold, and Resveratrol = 119-fold. The results indicate that 3 days of antioxidant treatment can reduce ROS levels, while 1 day is insufficient. The AD strain's impaired chemotaxis was exacerbated after 3 days, even when ROS levels were reduced. Aß mRNA levels after 4 days were elevated. Together our findings suggest that antioxidants can counteract some effects of Aß expression, but may ultimately be overcome by increasing Aß expression over time.

559 **Biomedical**

An *in silico* study of transforming growth factor-β1 induced collagen-I expression in human periodontal ligament

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Transforming growth factor (TGF)-β1 triggers growth of healthy and infected periodontal ligament. Through use of a patent-pending technology to perform predictive biosimulations, this study examines dose response of human periodontal ligament to TGF-β1 under two conditions, healthy and periodontitis. The *in silico* approach allowed testing different doses (0, 0.03, 0.1, 0.3, 1.0, 3.0, and 10 ng/ml) in each subject; doses commonly used for *in vitro* studies, where a dose response increase in extracellular collagen I has been reported. The computational model for TGF-β1 signalling was accessed from Reactome requiring manual curation for gene expression of collagen I by the canonical pathway. The Transcriptome-To-Reactome™ technology was used to derive model parameters from transcriptomes GSE27993 of NCBI GEO. A COPASI® software was used for deterministic kinetic biosimulations. GraphPad Prism® was used to perform the Two-Way ANOVA with repeated measures using Bonferroni and Tukeys post hoc tests for significant differences. The Two-Way ANOVA was significant for dose [$F(6,48)=15.4$; $p<0.0001$]. Only the two highest doses were significantly different from the four lowest doses. There were no differences between conditions. Linear regression of dose response was significant, but nonlinear regression analyses predicted a plateau effect at the dose of 1.0 and higher. Additional studies will be performed for more doses between 1.0 and 10 to test this prediction. The findings are consistent with published results on healthy tissue. Comparison with the literature validates the simulation's ability to mimic the conditions found in living tissue. This technology opens the door for new treatments for periodontal disease.

566 **Biomedical**

Validation of methionine aminopeptidase 1 as a potential chemotherapeutic target for trypanosomatids

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The trypanosomatids are parasites of medical importance that affect millions of people worldwide and cause a variety of diseases, including Human African Trypanosomiasis (HAT) and leishmaniasis, the etiologic agents, which are *T. brucei* and *Leishmania* spp., respectively. Treatments typically employ drugs with high toxicity and marginal efficacy. Also, the development of resistant strains to current treatments makes the case for the search of new and more effective drugs. In this regard, our focus is on, characterization of potential chemotherapeutic targets such as methionine aminopeptidase 1 from *T. brucei* (TbMetAP1) and *L. major* (LmMetAP1). MetAP1 catalyzes the removal of the N-terminal methionine residue from peptides and proteins. Previous studies have shown promising results of aminopeptidase inhibitors against malaria and tuberculosis. The TbMetAP1 gene was amplified by PCR from gDNA and cloned into the

expression vector pRSET A. The clones were transformed into BL21 and expression of TbMetAP1 and LmMetAP1 was induced with 1mM IPTG. Briefly, the cells were collected by centrifugation in lysis buffer and incubated at 4°C with agitation. The pellet was sonicated until homogenous, centrifuged, and the soluble fraction was collected. The recombinant proteins were purified using affinity chromatography and dialysis at 4°C. SDS-PAGE and western blot analysis were carried out to evaluate purifications and confirm the presence of the recombinant proteins. Currently, we are working on the optimization of the enzymatic assay conditions and in generating a *L. major* MetAP1 knockout strain. These studies will allow for the characterization and validation of potential chemotherapeutic targets against these trypanosomatids.

P572 **Biomedical**

Methicillin-resistant *Staphylococcus aureus* in Cats of the Coastal Bend Region

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Staphylococcus aureus is an opportunistic pathogen and common constituent of the skin and mucosal membrane microbiota of humans and animals. The appearance of methicillin-resistant *S. aureus* (MRSA) has been cause for concern in clinical and community settings. The mechanism for methicillin resistance is conferred by the mecA cassette which encodes the penicillin binding protein 2a (PBP2a). Due to the weak affinity of PBP2a for penicillin, MRSA strains are able to survive and reproduce in the presence of b-lactam antibiotics making the infections difficult to treat. Interspecies transmission of community-associated MRSA is suspected between humans and domestic animals due to the close interactions between people and their pets. The focus of this study was to determine the prevalence of MRSA among cats housed at non-kill shelters and a kill shelter. Additionally, isolated strains have been characterized at the molecular as well as biochemical levels. Samples were collected by swabbing the pharyngeal and perianal areas of the cats. Feral cats that were too unmanageable to handle were sampled by collecting their fecal matter and testing it for the presence of MRSA. Results indicate that cats are carriers of MRSA and potential sources of the pathogen for their owners. Also, the sampling of the cats' perianal region is more accurate than testing the pharyngeal area and the sampling of fecal matter is sufficient and representative of cats' carrier status of MRSA.

315 **Botany**

Comanche Peak Prairie Clover (*Dalea reverchonii*), a rare limestone glade endemic from North Central Texas

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Dalea reverchonii (Comanche Peak prairie clover) is a rare endemic in Texas classified as globally imperiled and at high risk of extinction due to restricted range and few populations. It was first discovered by Julien Reverchon, an early Texas botanist, on Comanche Peak in Hood County in 1882. Other populations were historically known from Parker and Wise counties. Comanche Peak prairie clover is hypothesized to be a walnut limestone glade endemic occurring in Parker, Hood, and Somervell counties in North Central Texas. We compared a large population discovered in 2010 on a walnut limestone glade in Parker County, Texas to a population observed in a peripheral limestone barren. Numbers of *D. reverchonii*, richness, and coverage associated with plants significantly differed between barren and glade populations. Associated plant species also differed between barren and glade habitats. Number of flowering stems, length of flower heads, and diameter of plants of *D. reverchonii* were not significantly different when comparing barren to glade populations. This data supports the hypothesis that *D. reverchonii* is a walnut limestone endemic and best adapted to glades.

P357 **Botany**

Pathogenicity of *Alternaria alternata*, *Phoma sorghina* and *Fusarium moniliforme* on *Sorghastrum nutans* (L.) Nash

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Alternaria alternata, *Phoma sorghina* and *Fusarium moniliforme* were cultured from leaves of *Sorghastrum nutans* (L.) Nash (Indiangrass) exhibiting symptoms of leaf spot. Leaf sections from the margins of the damaged tissue were surface sterilized and plated onto potato dextrose agar (PDA). The three species were isolated and maintained in pure culture on PDA. Indiangrass seeds of the varieties Osage, Lometa and Rumsey were aseptically germinated on moist filter paper. Seedlings were transferred to 3 inch pots and grown to maturity in the greenhouse. A randomized block of 36 Indiangrass plants, 12 of each genotype, was established under field conditions. Conidia of each suspected pathogen were suspended in aqueous Tween 80 and atomized onto healthy leaves in order to test these species for pathogenicity. Negative control plants were inoculated with a Tween 80 solution. Plants were covered with plastic bags for twenty four hours to maintain humidity and monitored daily for symptom development. At 10 days post inoculation all three Indiangrass genotypes inoculated with *P. sorghina* developed necrotic lesions from which this species was subsequently isolated. Plants inoculated with *F. moniliforme* and *A. alternata* and negative control plants did not develop lesions. It is concluded that *P. sorghina* is pathogenic to the three Indiangrass genotypes tested, whereas *F. moniliforme* and *A. alternata* appear to be nonpathogenic to these varieties

371 **Botany**

Variation in vegetation structure in response to soil type, moisture regime, and elevation at Naval Outlying Field (NOLF) Goliad, Texas

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A comparison of vegetation communities in habitat areas at Goliad Navy Airfield in Goliad County, Texas, was conducted in order to determine plant associations and their relationship to environmental factors. Identification of species present is used by the US Navy in order to comply with the National Environmental Policy Act of 1969 and the Endangered Species Act of 1973. Six distinct sampling areas were identified by variations in soil type, elevation, moisture regime, and vegetation community structure. Four sampling events were performed every three months between July 2011 and June 2012 to observe seasonal variation. Three parallel 100 m photo-line transects were performed at each habitat with the exception of area F, which was broken into three large sub-areas where one similar transect was taken per sampling period. A voucher collection of plants and digital images was entered into the database and stored in the TAMU-CC Herbarium for future reference. Digital images obtained from photo transects were evaluated using a modified version of Coral Point

Count with Excel extensions to determine mean, standard deviation, standard error, relative species abundances, and community structure for each transect at each habitat area during each sampling event. Point Count data will be uploaded to PRIMER v6 for multivariate statistical analysis. Bray-Curtis, cluster functions, and multidimensional scaling plots will be used to calculate species assemblage and similarities within and among habitat areas. GIS was used to create a map showing the distribution of species within the study area.

383 **Botany**

An annotated vascular flora of The Nature Conservancy Preserve of the Davis Mountains, Jeff Davis County, Texas

J. James Keeling, Sul Ross University, Alpine, TX

The Nature Conservancy's Davis Mountains Preserve (DMP) is located 40 km north of Fort Davis, Texas in the northeastern region of the Chihuahuan Desert. The Davis Mountains are the largest single range in the Trans-Pecos Texas volcanic field, spanning from 1524 to 2560 m in elevation, and were part of a continental volcanic arc active in Texas between 48 and 31 Ma. The cool-temperate region receives an annual precipitation between 28 and 57 cm with the majority occurring during the late summer monsoonal months. This "sky island" ecosystem caters to the requirements that are needed to accommodate a wide range of vegetation patterns, endemism, and unique biodiversity. Forests composed of pinyon pine, juniper, and mixed conifer species dominate the elevations between 1747 and 2469 m, while desert grasslands dominate the lower. Dominant species of the forests include *Juniperus deppeana, Quercus grisea, Q. gravesii, Q. hypoleucoides, Pinus cembroides, P. ponderosa,* and *P. strobiformis.* The current study began in May of 2011 and aims to catalogue the vascular flora of the 32,000 acres of Nature Conservancy property south of Highway 118 and directly surrounding Mount Livermore. Previous botanical investigations are presented, as well as biogeographic relationships of the flora. Many sampling areas were selected according to their intricacy of topography resulting in likely unique, but unvisited, microhabitats such as deep, sinuous canyons and the tops of higher peaks. The best represented families are the Asteraceae, the Poaceae, and the Fabaceae.

418 **Botany**

Are isolated populations of *Populus tremuloides* (Quaking Aspen) in the Davis Mountains of west Texas related?

Jerritt Nunneley*: UTSA / Texas Biomedical Research Institute and Dr. Oscar Van Auken: UTSA

Populous tremuloides (quaking aspen), one of the most widely distributed woody species in North America, spans from the Pacific Ocean to the Atlantic Ocean in the northern United States and Canada, and at higher altitudes throughout the rest of the continental United States, south into Mexico. *P. tremuloides* is a clonal species that reproduces vegetatively via root sprouts, yielding genetically identical stems or ramets. In west Texas, isolated populations exist in the Guadalupe, Davis, and Chisos Mountains at elevations of approximately 2300 m. This project examines seven microsatellites or simple sequence repeats (SSRs) from leaves of seven isolated populations within the Davis Mountains to determine if each of the individual populations is genetically identical to one another and if each stand is homogeneous. This study tests whether the current individual populations were at one time a single, larger population. Examination of polymerase chain reaction (PCR) amplicons visualized by 1.5% electrophoresis agarose gels reveal identical banding for all SSRs for each population indicative of clonal reproduction and suggests that these seven populations historically may have formed a continuous population through the Davis Mountains. Currently, fragment analysis and sequencing are underway to provide concrete data revealing the true molecular genetic makeup of the microsatellite products. Preliminary fragment analysis of the Big Tree stand identified previously described alleles for SSR PMGC-2571 and amplification of new, novel alleles for the remaining SSRs. Furthermore, the analysis validates that the agarose gels provide evidence of heterozygosity of several alleles.

P423 **Botany**

Wetland plant phenology as influenced by variable climate: a preliminary study

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Plant phenology is a useful tool in studying the impacts of global climate change on ecosytems. Changes in plant phenological responses (first flowering, peak flowering, etc.) may lead to changes in many ecological relationships within a system. However there is great variability in species phenological responses to global warming. In early 2012 we set up four transects in two cells of the Lake Waco Wetlands to study the timing and abundance of flowering for several wetland species. Surveys were taken approximately once a week, counting either individual flowers or inflorescences. First flowering, peak flowering, and the number of flowers/inflorescences were compared among different species as well as compared with climate variables (precipitation, maximum air temperature, and minimum air temperature) to determine potential predictors. We found the phenology patterns varied among species. *Schoenoplectus californicus* flowered the earliest, soon after the last frost, but declined by mid-summer. Other species flowered later but lasted throughout the summer and into early to mid-fall. Only *Typha domingensis* continued flowering into mid-winter. *Echinodorus berteroi*, *Echinodorus cordifolius*, *Nymphaea mexicana*, and *Alternanthera philoxeroides* were the only species that showed a slight positive correlation with maximum and minimum temperature. This project is the basis of a long term monitoring of wetland vegetation to learn more about phenological responses to continued climate change.

451 **Botany**

Spore production in *Asplenium platyneuron* and *Woodsia obtusa* from Walker County, Texas

Joan Nester-Hudson*, Sam Houston State University, Huntsville, TX and Jessica Jemison

Fern fronds are known to produce millions of spores but very few species have been studied. This study determined the approximate number of spores produced by a typical frond of *Asplenium platyneuron* and *Woodsia obtusa*, homosporous ferns which are native to the eastern US, including Walker County, Texas. Sporangia are clustered into sori on the underside of the leaflets. Twelve fertile fronds of each fern were collected in Walker County in May and June 2007. Fronds were pressed in a plant press for preservation. For *A. platyneuron*, the tip (1-2 cm) and basal leaflets without sori were excluded from counts. In *W. obtusa*, 1.5 cm of the tip was not counted. For both ferns, the remaining fronds were divided into three sections and number of leaflets per section was determined. A leaflet in the middle of each section was used to determine the number of sori per leaflet and number of sporangia per sorus. Unopened sporangia were used to determine 48 spores per sporangium. For*A. platyneuron*, the average total number of spores produced by one frond was 2,300,000 with a range of 1,200.000 to 5,400,000. For *W. obtusa*, the average total number of spores produced by one frond was 910,000 with a

range from 21,000 to 2,200,000. Since both ferns produce several fronds each growing season, large numbers of spores are dispersed from sporangia and these spores have the potential to produce large numbers of gametophytes.

461 **Botany**

Photosynthetic requirements of juvenile *Acer grandidentatum*

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The effects of light intensity on juvenile *Acer grandidentatum* survival and growth were evaluated in two experiments. Five seedlings were grown for six months at 20%, 40%, 60% and 100% of ambient light. Survival, relative growth rates, and dry mass were compared. Additionally, ten *A. grandidentatum* saplings were randomly selected at Lost Maples State Natural Area near Vanderpool, TX. Five plants were found in a heavily shaded understory area, while five were in open areas where they received full sun for at least part of the day. Photosynthetic rates, transpiration rates, and stomatal conductance were measured at varying light levels and photosynthetic parameters were calculated and compared. Experimental seedlings grown at the 100% light level showed 100% mortality, while those at the 40% level showed zero mortality, which were significantly different from the mean. Total, aboveground, and belowground dry mass were significantly different across all four treatment levels. There were marginal but nonsignificant differences between relative growth rates. The only photosynthetic parameter that was significantly different between full sun and shaded leaves was mean maximum photosynthetic rate (A_{max}), which was 3.89±0.36 μmol CO_2 $m^{-2}s^{-1}$ at a PAR of 880 μmol m^{-2} s^{-1} in shaded leaves and 5.23±0.36 μmol CO_2 m^{-2} s^{-1} at a PAR at of 1200 μmol m^{-2} s^{-1} in sun leaves. *A. grandidentatum* may be characterized as an extremely shade tolerant, early succession plant with low growth rates. These factors can affect its ability to recover from herbivory and compete successfully with other plant species and must be considered when undertaking management or restoration efforts.

509 **Botany**

Variations in mescaline concentrations in the crown, subterranian stem, and root of *Lopophora williamsii* (Peyote) and ethnobotanical implications

Molly T. Klein*, M, M. Kalam and M. Terry

The tops (crowns) of peyote, *Lophophora williamsii* have historically been used by peoples of the Chihuahuan Desert for medicinal and religious purposes. Mescaline, the predominant psychoactive compound in the cactus produces effects on sensory perception that contribute to the psychological state attained by Native American Church (NAC) members ingesting peyote as sacrament in their religious ceremonies. The nonceremonial medicinal uses of peyote have not been studied to determine which constituent(s) of peyote (if any) may be pharmacologically active by the standards of Western medicine. Mescaline concentrations in peyote crowns are normally about 2−4% of the dry tissue weight. Mescaline concentrations in isolated subterranean stem tissue and isolated root tissue of peyote have not been previously reported. The objective of this study is to determine mescaline concentrations in the crown, subterranean stem, and root of *Lophophora williamsii*. This is accomplished by methanol extraction of alkaloids from ground dry tissue of each of the three tissue types, followed by a conventional acid-base extraction procedure. Separate determinations are done for each tissue type from each of 10 individuals from a South Texas population. This work has conservation implications, as it will determine the relative value – in terms of mescaline concentration alone − of each anatomical tissue type. If mescaline concentration in root proves to be substantially lower than that in the crown, then NAC members would be able to weigh the therapeutic value of the harvested root vs. the ceremonial value of preserving the plant by not harvesting the root.

P528 **Botany**

Seasonal occurence of epiphytic diatoms (Dinophyta) associated with the red algal genus *Batrachospermum* (Batrachospermales) in the South Concho River of west central Texas.

Lauren A. Langley* and Ned E. Strenth

This study reports the results of an ongoing monitoring program of a species of *Batrachospermum* from the South Concho River of west-central Texas. While DNA has been extracted and PCR conducted using the rbCL large subunit gene, identification of this species remains at an early stage.The primary purpose of this section of the study is to report a preliminary listing of epiphytic diatoms associated with this red algal species and their occurrence patterns from the fall of 2003 through 2012. The occurrence of diatom species reported herein is correlated with the seasonal occurrence of their *Batrachospermum* host. They appear in conjunction with the early algal filaments in late fall (November/December), persist throughout the winter months, and are present on the last filaments of *Batrachospermum* in early spring (March/April). Considerable variation was observed both between seasons and within individual seasons.While this is an ongoing study, the list of taxa observed so far include the following families and associated genera: *Tabellariaceae* (*Tabellaria*), *Amphipleuraceae* (A*mphipleura pellucida* and *A. frustrulia*), *Fragilariaceae* (F*ragilaria* and S*ynedra*), Naviculaceae (*Navicula*), *Stephanodiscaceae* (*Cyclotella*), and *Diploneidaceae* (*Diploneis*). *Tabellaria* and *Fragilaria* were by far the most abundant throughout the 10 year monitoring program, with *Tabellaria* being especially abundant during 2005 and 2010.

592 **Botany**

Temporal variation in the production of floral volatiles by the giant carrion flower (*Stapelia gigantea*)

Varsha Ramachandran* and David E. Lemke, Texas State University, San Marcos, TX

Floral scent plays an important role in the reproductive biology of many flowering plants, frequently serving as a pollinator attractant. In a majority of species, floral scent is a diffuse product of the epidermis, especially that of the corolla, although in some groups the production and emission of fragrance molecules is localized in special scent glands termed osmophores. In the present study, we examined temporal variation in the composition of floral fragrance in the giant carrion flower (*Stapelia gigantea*), a species well-known for its unpleasant floral odors. A headspace-solid phase microextraction procedure was used to collect volatile compounds produced by the flowers of *S. gigantea*, which were then separated and identified using gas chromatography-mass spectrometry analysis. A diversity of organic compounds was identified, the most common being dimethyl disulfide, dimethyl trisulfide, octatriene, cyclohexadiene, and the terpeoids ocimene and cymene. Odor emission was highest on the first day of anthesis and progressively decreased as the flower aged.

594 **Botany**

Vegetation of the Christmas Mountains, Brewster County, Texas: An overview

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The Christmas Mountains occupy approximately 4000 hectares of rugged terrain adjacent to Big Bend National Park in Brewster County, Texas. The property, once part of the historic G4 Ranch, was deeded to the Texas State University System in September 2011 for use as an educational and research area. A floristic inventory was begun in January 2012 and has identified four major vegetation assemblages on the property: a desert community dominated by creosotebush (*Larrea tridentata*) at elevations below approximately 1100 m above sea level; desert grassland dominated primarily by chino grama (*Boutleous ramosa*), sotol (*Dasylirion leiophyllum*), and lechuguilla (*Agave lechuguilla*) at elevations between 1100 and 1500 m; a sparse woodland of shin oak (*Quercus pungens*) and redberry juniper (*Juniperus pinchotii*) at the highest elevations; and an arroyo community dominated by a diverse array of shrubs traversing drainages across the desert flats and grasslands. The desert grasslands of the mid-elevations of the Christmas Mountains may represent one of the best examples of Chihuahuan Desert grassland in the southern trans-Pecos region of Texas.

598 **Botany**

A molecular phylogenetic study of the plant family Martyniaceae (order Lamiales) based on chloroplast and nuclear DNA

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The plant family Martyniaceae (order Lamiales), members of which are commonly known as devil's claws or unicorn plants, consists of 13 species in five genera. Traditionally placed within the family Pedaliaceae, Martyniaceae are native to arid and semi-arid places in North and South America. A molecular phylogenetic analysis of the Martyniaceae using three chloroplast gene regions (*psbA-trnH* spacer, *trnQ-5'rps16* intergenic spacer, and *trnS-trnG-trnG* spacer and intron) and the Internal Transcribed Spacer Region of nuclear DNA resolved two major clades within the Martyniaceae corresponding to the North American taxa (*Martynia* and *Proboscidea*) and the South American taxa (*Craniolaria*, *Holoregmia*, and *Ibicella*). The analysis suggests that the South American clade originated in central South America and dispersed northward into northern South America and the West Indies. The North American clade is hypothesized to originate in Central America, with subsequent dispersals generally occurring in a northward and eastward direction into the West Indies, northern Mexico and the southwestern United States. The analysis also resolved three major clades within *Proboscidea*, the largest genus in Martyniaceae. These clades correspond to the informal infrageneric groups (1) *P. sabulosa*, (2) *P. althaeifolia*, and (3) the "weedy" annuals. The analysis suggests that connate sepals have arisen twice within the phylogeny, and the hooks on the distal ends of the capsules of mature fruits have reduced in length three times. Sequences from all five genera and 11 of the 13 recognized species were included in the analysis.

P599 **Botany**

Dynamics of dry matter allocation in pod wall versus seed in common bean, *Phaseolus vulgaris*

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The seeds of *Phaseolus vulgaris,* or common bean, provide an important source of dietary minerals, nutrients, and fiber. In order to examine the potential for improvement in the nutritional quality and yield of seeds for human consumption, the factors affecting the allocation of dry matter between the seed and pod wall must be identified. Because previous studies demonstrated that genetic variation exists in the proportions of dry matter allocated between the seed and pod wall, we measured physical variables that are thought to correlate with and/or influence the partitioning of dry matter in a range of diverse Andean genotypes. We grew 47 different genotypes to full maturity in a greenhouse. Pods were harvested at mid-to late-pod fill for visual inspections and weight measurements, or at full maturity for length measurements of pod wall regions (per individual seeds), and dry weight analyses of seeds and pod walls. While the pod wall dry weight per length of seed position did not vary between genotypes, varieties with larger seed mass exhibited a higher partitioning of dry matter to the seeds (relative to the total pod). Also, the size and shape of the growing seed at full hydration in late seed development appeared to be associated with pod wall length per seed position and circumference, suggesting that the final seed size and weight could be limited by pod wall length. With this knowledge, further study of these genotypes can be used to identify parameters for maximizing dry matter allocation to seeds, specifically for use in Africa where an increase in nutritional yield is needed. This work was supported by funds from USAID as part of the Feed the Future Program.

313 **Cell and Molecular Biology**

Isolation of bacteriophages specific to *Escherichia coli*, *Staphylococcus aureus* and *Pseudomonas aeruginosa* from livestock fecal samples.

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Cross-species infections of methicillin-resistant *Staphylococcus aureus* (MRSA) from livestock to humans have been reported. Prior studies have isolated *S. aureus* and associated bacteriophages from dairy cattle. This research was undertaken to isolated bacteriophages specific for *Escherichia coli*, *S. aureus* and *Pseudomonas aeruginosa* from 13 beef cattle, 15 sheep and 12 goat fecal samples from a ranch in Tom Green Co., Texas. Phage enrichment was carried out using *E. coli* American Type Culture Collection (ATCC) strain 23848, *S. aureus* ATTC strain 13565 and *P. aeruginosa* ATCC strain PA01. Phage presence was detected using lawn spotting and reconfirmed using plaque assay. Bacteriophages specific to *E. coli*, *S. aureus* and *P. aeruginosa* were isolated from fecal samples of sheep and goats, while only *S. aureus*-specific phages were isolated from cattle feces. Statistical analysis using two-sample test of equal proportions and Fisher's exact test showed no significant differences in phage isolation success between livestock types.

333 **Cell and Molecular Biology**

Fgf8a interacts with ethanol to cause neural developmental defects

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In humans, developmental ethanol exposure can lead to fetal alcohol syndrome (FAS), in which variable craniofacial and neural defects arise. Although timing and dosage of ethanol influences FAS variability, genetic predisposition contributes as well. However, we know little of the genetic component of FAS. Using zebrafish (*Danio rerio*), we performed a genetic screen for dominant enhancers of ethanol teratogenesis. From this screen, we uncovered *fibroblast growth factor 8a* (*fgf8a*) as ethanol interacting. Untreated *fgf8a* mutants lack a cerebellum, however do not exhibit any neurocranial defects. Treating *fgf8a* mutants with a suboptimal dose of ethanol results in profound neurocranial defects where the posterior neurocranium fails to form. We wanted to investigate whether ethanol revealed any additional neural defects in *fgf8a* mutants. Using *in situ* hybridization, we compared the expression of neural genes in untreated versus ethanol treated *fgf8a* mutants. The results show that the patterning of *fgf3* and *fgf8a* are altered in the mutants, and *ngn1* expression is altered in the ethanol-treated mutants. Therefore, in summary, *fgf8a* mutants not only exhibit the expression of *fgf3*, a hindbrain marker and frequently co-expressed gene, but also increased ethanol sensitivity in patterning ngn1, a neural cell marker. In conclusion, we found that only *ngn1* exhibited a drastic change in expression in untreated versus ethanol-treated *fgf8a* mutants.

P363 **Cell and Molecular Biology**

Isolation and identification of bacteria recovered from oral and skin samples

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Microbiomes are microbe communities that exist in and on humans in areas such as the gut, oral cavity, and the skin. The microbes in these communities interact with each other and affect a human host's health and disease. While each person's microbiome differs, comparing them between different people can lead to identifying commonalities and similar mechanisms that could be useful in disease control. This study sought to identify bacteria from one human host that could then be added to a larger bank of oral and skin isolates. Samples were collected from the skin of the cheek and armpit and from the incisor surface and in between the molars. Samples were inoculated on a range of general and selective agars including gonococci agar, blood agar, mannitol salt agar, and others to obtain a range of different bacteria. The isolates collected were then subjected to 16s rRNA gene amplification, sequence analysis, and identification via BLAST. Bacteria identified included several *Staphylococcus* species, species of *Neisseria*, and *Rothia dentocariosa.* Continued research will finish identification of isolates. The identification of these bacteria will contribute to a larger study of microbiome interactions. Skin and oral isolates' potential to inhibit pathogen colonization will be evaluated. Oral and skin isolates will be evaluated on their potential to inhibit growth of common oral or skin pathogens, such as *Porphyromonas gingivalis* or *Streptococcus pyogenes*. A microdilution assay will be completed by co-culturing isolates with a pathogen to determine the inhibition or growth of the pathogen.

P367 **Cell and Molecular Biology**

Effects of nutritional stress on early development and patterning of *Drosophila melanogaster*

Roya Hossaini, St. Edwards University, Austin, TX

Studies have shown that environmental influences contribute to evolutionary changes. All organisms including humans must meet minimum nutritional requirements in order to successfully reproduce, and nutritional variation can directly affect the phenotype of an organism. Previous research using *Drosophila melanogaster* has demonstrated that nutritional deficiencies can be directly linked to morphological variation. Here we examined the effects of sugar nutritional deficiency on maternal fertility and production of *yolk protein (yp)* mRNA during oogenesis. Flies were raised for two generations on high and low sugar medium, and subsequently assayed for egg production and *yp* transcription in ovaries. Decreased fecundity of females was observed in relation to nutritional stress. Additionally, an inverse relationship between the amount of transcript and sugar content was also observed. These studies will provide a better understanding of the effects of nutritional stress on reproduction and early development.

380 **Cell and Molecular Biology**

Examination of the role of the calcineurin OSM-9 in mediating enhanced olfactory discrimination in *Caenorhabditis elegans*

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Olfactory responses, and alteration of responses based on environmental conditions, are essential to survival for many animals. *Caenorhabditis elegans*, which lacks auditory- and photoreceptors, and relies heavily on olfaction, can modulate its responses using the chemosensory neuron pairs responsible for primary odorant detection. Cross-saturation, a complex olfactory response in which exposure to a saturating concentration of one odorant diminishes the ability to perceive another odorant detected by the same chemosensory neuron, is known to occur only in a well-fed state (Bargmann 1997). Starvation enhances olfactory discrimination, suggesting modulation of intracellular signaling in chemosensory neurons as a response to changing environmental factors. In this study we examined OSM-9, a calcineurin believed to regulate adaptation (diminished response following prolonged exposure) to isoamyl alcohol and relay information about feeding state (Colbert 1997, Harris 2011). OSM-9 was examined for its ability to enhance olfactory discrimination between isoamyl alcohol and benzaldehyde following starvation. Three strains were used: wildtype, OSM-9 loss-of-function (CX10, accounting for systemic OSM-9 function), and AWA loss-of-function (CX4, confining activity to the AWC neuron pair). Strains were compared in a series of cross-saturation and adaptation assays to either benzaldehyde or isoamyl alcohol. Both assays required a pre-starvation period, followed by odorant exposure and testing. The chemotaxis index for each assay was calculated to quantify behavioral alterations signifying changed olfactory responses. RNA was extracted from all strains after starvation or after odorant exposure, and real time PCR was used to quantify expression of the *osm-9* gene at various points in starvation and olfactory response.

P381 **Cell and Molecular Biology**

The effects of oxygen culture levels on the adaptive response of two-dimensional (2D) mono layer and three-dimensional (3D) epithelial micro-cell culture systems

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The Adaptive Response (AR) is a protective phenomenon in which cells or animals exposed to a low-dose of ionizing radiation are transiently protected against a variety of effects from subsequent higher exposures. In the present studies human mammary epithelial cells (MCF10A) were used to investigate the effect of a low-dose exposure prior to a high challenging dose. Micronuclei (MN) were scored as markers of induced DNA damage, which appear as extra nuclear bodies that are formed from un- or mis-rejoined double strand breaks (dsb). Scoring the formation of MN in bi-nucleated cells can be used as a biomarker for genomic instability. MCF10A cells were grown in 2D mono-layers and 3D cell culture systems at atmospheric (20% O_2) or physiological (3% O_2) oxygen levels. MCF10A cells were exposed to a low adaptive dose of 10 cGy and challenged 4 hours later with a higher dose of 2 Gy of X-rays. Mono-layer cell cultures were used to perform proliferation tests, and it was discovered that MCF10A cells grow slightly better under a more physiological oxygen concentration of 3%. Cells growing in the 3D gel matrices showed cell morphology more like intact tissue by forming acinar structures. Morphology studies in 3D showed that the branched tubular growth patterns occurred more often in 3% oxygen which better mimics *in vivo* conditions. Future experiments will help us gain a better understanding of the effects of chronic low-dose radiation exposure to human cells by using a beta-ray emitter. It was hypothesized that low dose radiation would cause an adaptive response in micro-cell culture systems under atmospheric or physiological oxygen.

P398 **Cell and Molecular Biology**

An epigenetic approach to insecticide resistance

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The housefly, *Musca domestica*, is the most common of all domestic flies and is responsible for the transmission of bacterium, causing dangerous infections such as cholera and shigellosis. Insects and parasitic vectors such as the housefly have been difficult to control with insecticides, due to their rapid ability in developing insecticide resistance. Recent studies have shown that insects resistant to insecticides express increased activity of enzymes able to break down and metabolize insecticides. One significant group of enzymes, found aberrantly in insecticide resistant *M. domestica* is a family of monooxygenases (P450s). The monooxygenase enzymes are found to be essential in an insect's ability to degrade insecticides. Yet, why and how these enzymes are hyper-expressed in insects is uncertain. Separate studies in insects' genetics, though, have elucidated a biological and epigenetic mechanism, known as DNA-methylation that within insects appears to increase gene expression. With such knowledge and understanding, it is befitting to hypothesize that increased DNA-methylation could be a factor in the up-regulation of genes coding for P450 enzymes that break down insecticides. To our current knowledge no studies have been published on the presence or effects of DNA-methylation on P450 genes. Through the methods of bisulphite sequencing and quantitative-real time polymerase chain reaction we look to identify and quantify the amount or lack of DNA-methylation within the P450 genes. A positive finding could lead to a better understanding of insecticide resistance and a nuanced approach in developing insecticides or enzyme target inhibitors.

401 **Cell and Molecular Biology**

Eavesdropping on bacterial communication: Can normal flora increase the resistance of *Pseudomonas aeruginosa* PA14 to Tobramycin, Ciprofloxin, or Tetracycline?

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Pseudomonas aeruginosa is a gram-negative bacterium that thrives in the mucous accumulated in the lungs of patients with the heritable disease cystic fibrosis or compromised systemic immunity. The ability of *P. aeruginosa* to produce large amounts of biofilms, hydrated matrix of polysaccharide and protein, is one of the many characteristics that allows it to develop strong insensitivity to many antibiotics. Biofilms provide a nutritious environment for other bacteria as well. These microbial communities utilize diverse mechanisms to resist the action of antimicrobial agents. This study will focus on screening interactions of skin and oral isolates when co-cultured with*P. aeruginosa.* It was hypothesized that different combinations of bacteria can affect each other with regard to their sensitivity or insensitivity to numerous antibiotics. This specific type of co-culture testing has not been seen in previous literature. In this study skin (cheek and armpit) and oral (canine tooth) normal flora were isolated using various media including: Blood Agar, Phenyolethyl Alcohol Agar, Mannitol Salt Agar, Propionibacterium Agar, and McConkey Agar, Brain Heart Infusion Agar, GC Agar, Laked Sheep Blood Agar. Skin and oral isolates were identified via 16s ribosomal RNA gene amplification, sequence analysis and BLAST search. Ten isolates were successfully identified as *Staphylococcus capitis, Staphylococcus warneri, Staphylococcus hominis, Staphylococcus epidermidis, Staphylococcus caprae, Neisseria dentiae, Neisseria subflava, Neisseria pharyngis, Neisseria flavescens,* and *Rothia dentocariosa.* Current experiments include testing the sensitivity of *P. aeruginosa* to tobramycin, ciprofloxin, and tetracycline when co-cultured with each of the ten isolates.

P404 **Cell and Molecular Biology**

Apolipoprotein E 4/4 serum inhibits growth of malaria in culture

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PURPOSE: Our evolutionary history has been characterized by a constant war between pathogenic microorganisms and various defense mechanisms to counter their pathogenicities. For instance, heterozygotic individuals with sickle cell trait are protected against severe falciparum malaria infections, and the high frequency of hemoglobin S in Africa is due to the selective advantage of the balanced polymorphism. The apolipoprotein E4 (ApoE4) allele has been linked to the pathogenesis of Alzheimer's disease, cardiovascular disease, and atherosclerosis, but these occur late in life, when the force of natural selection has become attenuated. However, the frequency of ApoE4 is highest in the African subcontinent (especially in sub-Saharan Africa) and certain other isolated populations, such as in Papua New Guinea, all areas which exhibit endemic malaria. One hypothesis is that ApoE4 may give a selective advantage against falciparum malaria. DESIGN METHODS: In these studies, we determine the growth of malaria in human serum with different ApoE isoforms. RESULTS/CONCLUSION: We find malaria growth is greatly inhibited by ApoE4/4 serum, suggesting its maintenance in modern

humans is a balance between early-life protection from malaria and increased risk of late-life diseases.

P417 **Cell and Molecular Biology**

Identification of regulated gene sequences during regeneration in *Lumbriculus variegatus*.

Marianna Gonzalez*, Pompeyo R. Quesada, and Veronica G. Martinez-Acosta

The study of wound healing and regeneration has become a major research focus for the development of potential regenerative therapies. Most higher order phyla, have lost the ability to regenerate. As wound healing becomes more complex, our regenerative abilities become lost in translation. However, invertebrate phyla such as annelids retain this quality and are excellent at regenerating. Lumbriculus is an excellent regenerative model system. Although cellular and physiological studies of regeneration in Lumbriculus have begun to shed light on the molecular processes that this remarkable animal uses for regeneration, the model system is still in the infancy stages of development of molecular techniques that are necessary to study regeneration and the genetic level. Using degenerative primer sets from *Caenorhabditis elegans* and Drosophila melanogaster, for various developmental genes, like beta-catenin, we present the initial attempts at identifying sequences that are up-regulated or down-regulated in expression during Lumbriculid regeneration. Degenerate primers were designed against bar-1 (C.elegans) and armadillo (D.mel). Sequence analysis of the two fragments will be compared to homologs in C.elegans, D.melanogaster, mouse, and humans. This study will lay the ground-work to study regeneration at the genetic level for this unique model system.

P421 **Cell and Molecular Biology**

Cytotoxic and apoptotic effects of *Zingiber officinalea* (ginger root) and *Sanguinaria canadensis* (blood root) in 4T1 murine breast cancer cells.

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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 a several medicinal plants were found to be cytotoxic on the 4T1 murine breast cancer cell line. This study sought to further investigate whether two of these plant extracts, *Zingiber officinalea* (Ginger Root), and *Sanguinaria canadensis* (Blood Root) were causing apoptosis and / or cell cycle arrest. Cells were assayed for apoptosis and cell cycle arrest using caspase activity assays and western blots to determine activity and / or presence of caspase and cell cycle proteins following treatment of 4T1 cells with blood root and ginger root.

436 **Cell and Molecular Biology**

Modulation of acetylcholine signaling and its effects on protein aggregate clearance and toxicity in a transgenic *Caenorhabditis elegans* ASH neuron

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Aggregates of misfolded proteins are a hallmark of neurodegenerative proteopathies, including CAG-repeat disorders such as Huntington's disease (Kakizuka, 1998). Expanding the polyglutamine tract of human huntingtin protein beyond pathogenic threshold of 35-40 repeats results in inefficient clearance of disease proteins by the ubiquitin-proteasome pathway (Goldberg, 2003). Recent molecular studies indicate that autophagy may also degrade these aggregates (Ravikumar *et al.,* 2002; Berger *et al*., 2006; Jia *et al*., 2007). In *Caenorhabditis elegans*, autophagy is generally upregulated during starvation through the TOR kinase pathway, and increased acetylcholine signaling has been shown to result in an upregulation of autophagy in pharyngeal muscle cells (Kang *et al*., 2007). We examined the effects of modulated acetylcholine signaling in a transgenic model of Huntington's in *C. elegans*. This strain expresses a fragment of the human huntingtin protein with 150 glutamine repeats in the ASH and other sensory neurons. Specifically, we modulated acetylcholine signaling by treatment with 30mM exogenous choline (acetylcholine precursor), 5mM pyridostigmine bromide (acetylcholinesterase-inhibitor), or 5mM arecoline hydrobromide (muscarinic-acetylcholine-receptor agonist). Worms were treated and tested either 4 or 8 days after hatching. All treatments were administered in M9 buffer for 30m immediately prior to testing. Following treatment, two behavioral assays were conducted to assess mechanosensation and chemosensation. Treatment with pyridostigmine bromide was most effective and partially rescued mechanosensation (28%) and chemosenstation (51%) on both days. These findings suggest that treatments with acetylcholine precursor or receptor agonist may be masked by endogenous acetylcholinesterase activity. Furthermore, a promising treatment for Huntington's may be an acetylcholinesterase inhibitor.

438 **Cell and Molecular Biology**

Isolation and characterization of an ethanol-sensitive Zebrafish mutant

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Gene-environment interactions are likely to play a role in susceptibility to ethanol-induced developmental defects, such as lower jaw hypoplasia. Most of the craniofacial skeleton, including the lower jaw, derives from neural crest cells that migrate from the dorsal neural tube into pharyngeal arches. Within the pharyngeal arches, signaling between the neural crest, the oral ectoderm, and the endoderm is crucial for proper jaw formation. To identify genes regulating susceptibility to ethanol-induced defects, we performed a forward genetic screen to identify ethanol-sensitive mutants. From this screen, we recovered *uta15*. Under control conditions, *uta15* mutants have no apparent defects. However, upon exposure to 1% ethanol, mutants have a reduction or loss of the lower jaw. *uta15* mutants are most sensitive to ethanol between 6-48 hpf, when the neural crest cells that will generate the lower jaw are migrating and condensing in the pharyngeal arches. In 36 hpf ethanol-treated *uta15* mutants, the neural crest-derived progenitors of the lower jaw are specified appropriately and no defects were apparent in endoderm morphology. In contrast, in ethanol-treated mutants, the neural crest cells that generate the lower jaw appear loosely aggregated instead of condensed, as in wild-type embryos. Currently, we are genetically mapping *uta15* to determine the causative mutation. Overall, this work will provide greater insight in the importance of gene-ethanol interactions that can help in diagnosis and treatment.

P455 **Cell and Molecular Biology**

Use of crowdfunding in undergraduate research

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Due to the recession, research labs across the country are losing funding for their projects. Scientists have to get creative in order to raise money. Thanks to social media we are able to reach people outside of the scientific community and raise project awareness through Facebook, Twitter, LinkedIn and YouTube via crowdfunding websites. I created a project profile on Fundageek.com to raise money and awareness of our "Creating *Wolbachia*-based biocontrol of horn flies" project. We offered incentives to donors, including email updates of our progress, Skype conferences with the team and, for the highest donor, credit for financial support in any published papers. Over 21 days, we were able to raise $1,070 and create public interest in our work. The funding supplemented grants from the USDA and enabled the lab to hire more student researchers for the spring semester.

P459 **Cell and Molecular Biology**

The effects of genetic background on the expressivity of EGFR pathway mutations affecting *Drosophila melanogaster* eggshell patterning.

Laura Youngblood*, Lisa M. Goering, St. Edward's University, Austin, TX

Genetic variation between individuals can result in variation in the phenotypic effects associated with a particular mutation. 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 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.

P460 **Cell and Molecular Biology**

Retinoic acid regulates musculoskeletal attachments in the zebrafish head

Catherine Hughes, St. Edward's University, Austin, TX, Patrick McGurk and Johann Eberhart, University of Texas at Austin, Austin, TX.

Craniofacial malformations are among the most common of birth defects. To understand the developmental processes governing congenital malformations we use the zebrafish, *Danio rerio*, as a developmental model. Retinoic acid (RA) is a molecule essential for cephalic development, but its role in developing craniofacial tissues is unknown. The distribution pattern of RA is created by cells that express RA-synthesizing enzymes and those that express *CYP26* enzymes, which degrade RA. In zebrafish, loss of *cyp26b1* results in craniofacial defects in both the skeleton and musculature. By inhibiting RA synthesis between 51-57 hours post-fertilization (hpf), we specifically decrease the rate of muscle defects in *cyp26b1* mutants. To assess what effects RA has on gene expression in the head at this time, we performed *in situ* hybridization for genes specific for tissue specification and craniofacial patterning in both mutant and wild type embryos. Based on preliminarily results, we believe that expanded RA in *cyp26b1* mutants causes misexpression of the tendon specification transcription factor *scxa*. These results will be interpreted in terms of tendon and muscle cells. Future research would improve understanding about how tissue interactions determine the morphology of the vertebrate head.

P471 **Cell and Molecular Biology**

Molecular cloning and characterization of cellulases and polygalacturonase genes of *Pectobacterium carotovorum* in *Escherichia coli*.

Eman Ibrahim*, Kim D. Jones, Jean Escudero Texas A&M University Kingsville, Kingsville, TX, and Ebtesam Naiem, Al Azhar University, Egypt

Lignocellulosic biomass has potential for bioethanol production that is a renewable fuel. A limitation is that the bioconversion of the complex lignocellulosic material to simple sugars and then to bioethanol is a challenging process. Recent work has focused on the genetic engineering of a biocatalyst that may play a critical role in biofuel production. The genetic engineering of *Escherichia* coli has been considered a convenient biocatalyst in biofuel production for its fermentation of glucose into a wide range of short-chain alcohols and production of highly deoxygenated hydrocarbon. The bacterium *Pectobacterium carotovorum* is notorious for its maceration of the plant cell wall causing soft rot. The ability to destroy plants is due to the expression and secretion of a wide range of hydrolytic enzymes that include cellulases and polygalacturonases. *CelB CelC* and *Peh* encode endugluconases and polygalacturonase, respectively. Primers were designed based on published gene sequences and used to amplify the open reading frames from the genomic DNA of *P. carotovorum.* The individual PCR products were cloned into the PTAC-MAT-2 expression vector and transformed into *Escherichia coli*. Estimation of the molecular weights of the expressed proteins was performed using SDS-PAGE analysis and *CelB* and *CelC* products were approximately 27 kD and 39 kD, respectively. The characterization of the expressed protein of *Peh* is currently underway. The quantitative determination of the cellulosic activity of the endogluconases was carried out using DNS-carboxymethylcellulose method for endugluconase activity. A modified derivatization method of reducing sugars using GC-MS was used for quantification of the enzymatic activity.

P478 **Cell and Molecular Biology**

The effects of naturally occurring cardioprotective compounds and possible synergy with resveratrol on macrophage function

Jana Soares,* Peter J. King. St. Edward's University, Austin, TX.

Ischemic heart disease, predominately caused by atherosclerosis, is the leading cause of death for males and females in developed nations. Atherosclerosis is an inflammatory process where macrophages accumulate in the arteries and consume oxidized cholesterol, by phagocytosis. The accumulation of "foamy macrophages" and reactive oxygen species (ROS) production drive atherosclerosis. Epidemiological studies suggest a link between a diet rich in plant polyphenols and a lowered risk of cardiovascular disease. Some polyphenolic compounds found in olives and grapes have antioxidant properties, where olive oil polyphenols protect against inflammation and red wine polyphenols inhibit smooth muscle migration. We wanted to determine if the cardioprotective compounds, tyrosol and ß-sitosterol, found in olive oil, had synergy with resveratrol, found in grape skins, in inhibiting phagocytosis, ROS production, and foamy cell production in macrophages. Assays for ROS, foamy cells, and phagocytosis, tested the effect of these substances. Results showed a decrease in ROS production when cells were stimulated with phorbol 12-myristate 13-acetate (PMA) and treated with ß-sitosterol and tyrosol. When phagocytes were pre-incubated with the antioxidants before adding PMA, ß-sitosterol exhibited short-term effects of inhibition. A dose response curve of ß-sitosterol in the phagocytosis assay was not as promising as previous results obtained in the lab with trans-resveratrol. ß-sitosterol did not inhibit foamy cell formation. In the future, we will test tyrosol to see if it has anti-inflammatory effects on macrophages using the phagocytosis and foamy cell assays. These results suggest that tyrosol and ß-sitosterol may not have synergy with resveratrol in inhibiting macrophage function.

P479 **Cell and Molecular Biology**

Investigating essential amino acid metabolism using isobutyrate-resistant mutants in *Arabidopsis thaliana*

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Isobutyrate 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 isobutyrate. By growing seeds aseptically on medium supplemented with varying amounts of isobutyrate, I identified potential mutants in *A. thaliana* that appear to be resistant to isobutyrate-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 isobutyrate in *Arabidopsis*. Through these investigations, we will better understand essential amino acid metabolism and similar metabolic processes in the human body to help alleviate malnutrition.

P491 **Cell and Molecular Biology**

Enhancement of lipid production of the marine green microalgae *Nannochloris* sp

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Cost-effective production of biodiesel from algae requires a high yield of lipid by the cultured cells. Lipid content of algal cells can be manipulated by controlling culture conditions such as light, temperature, nutrient level and in the case of marine species, salinity. As part of an effort to find and develop new algal strains for lipid yield, we used the marine green microalga *Nannochloris* sp. to develop a standard methodology to apply to new algal strains. Cells were grown in monoculture in f/2 medium initially and then were shifted to nitrogen-free medium. Lipid content was monitored spectrophotometrically using the neutral lipid stain, Nile Red and cell abundance was monitored by *in vivo* fluorometry. Lipids increased nearly 80% in sixteen days then started to decline. Meanwhile cell abundance increased only by 25% indicating the lipid content per cell increased during the nitrogen starvation period. These methodologies will allow us to evaluate many strains in an efficient manner.

P505 **Cell and Molecular Biology**

The role of *orthodenticle* in early embryonic patterning in *Drosophila simulans*

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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 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.

508 **Cell and Molecular Biology**

Quantifying the progressive loss of locomotive control in transgenic Parkinson's disease *C. elegans* strain, using BSR analysis.

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Parkinson's disease (PD) is a common neurodegenerative disorder affecting 1 million people in the U.S. with 60,000 additional patients diagnosed each year (PD Foundation). PD is characterized by the degeneration of dopaminergic neurons and subsequent decreased locomotive control, as well as aggregations of alpha-synuclein protein in Lewy bodies (Lundblad, 2002), and elevated neuro-inflammation. The time-course for development of the neuropathologies and the symptoms has not yet been clarified. The transgenic Parkinson's strain of *C. elegans* (NL5901) expresses the alpha-synuclein gene and serves as a useful model to quantify progressive degeneration of locomotion and dopaminergic neurons over the lifespan of the organism. Basal slowing rate (BSR) provides a measure of voluntary motor control in *C. elegans* and was assessed at several time-points in the lifecycle of the PD strain and N2 controls. The calculated average basal slowing rate (BSR) for N2 was 0.15 in early adulthood, and increased to 0.58 at late adulthood, indicating that locomotive control diminished with age. In comparison, the calculated BSR of the PD strain was 0.52 in early adulthood, and increased to 0.83 by late adulthood. The data suggest that the expression of alpha-synuclein alone is sufficient to cause locomotive impairment that is characteristic

of PD. Additionally, the motor deficit became progressively more severe with age. This may be due to a continuously increasing alpha-synuclein load, or may be due to a combination of alpha-synuclein and neuro-inflammation. Future experiments will address this question.

522 **Cell and Molecular Biology**

Methicillin-resistant *Staphylococcus aureus* in domestic cats of the Coastal Bend region

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Staphylococcus aureus is an opportunistic pathogen and common constituent of the skin and mucosal membrane microbiota of humans and animals. Methicillin-resistant *S. aureus* (MRSA) is most commonly known as a human pathogen potentially acquired in hospitals. Research has shown that MRSA can be nosocomial (hospital-acquired) or community-associated. Interspecies transmission of community-associated MRSA is suspected between humans and domestic animals. Domestic cats are potential reservoirs for MRSA in the home. Fecal samples and swabs of the pharyngeal and perianal areas will be analyzed. The objectives of this research are to conduct a survey of MRSA prevalence in four animal care facilities, to compare prevalence in feral *versus* household cats, to indentify possible interspecific and intraspecific transmission, and to conduct molecular indentification and characterizations of the mecA gene in antibiotic-resistant samples.

526 **Cell and Molecular Biology**

Inhibition of foam cell formation in mouse macrophage cells by resveratrol

Cristina Alvarado and Dr. Peter King, Saint Edward's University, Austin, TX.

Atherosclerosis, the most predominant cause for coronary artery occlusion, is caused by plaque buildup in the arterial walls due to high levels of cholesterol in the blood. Macrophages are the main cells involved in the progression of this disease. Resveratrol, a compound found on the skin of grapes, has been understood to reduce plaque buildup. This study sought to further comprehend the process of foam cell formation in macrophages and to see how resveratrol alters that process. Mouse macrophage cells were taken and induced with Low Density Lipoprotein (LDL) then treated with resveratrol at various times during their life cycle. The formation of foam cells was observed within different concentrations of resveratrol. Resveratrol was seen to substantially reduce foam cell formation. Results showed that resveratrol can decrease the foam within macrophages that have engulfed LDL and return the cells to a state similar to normal.

P579 **Cell and Molecular Biology**

Separation of supercoiled and relaxed DNAs electrophoresed in varying concentrations of ethidium bromide

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Most naturally occurring closed duplex DNAs are negatively supercoiled, and they can be converted to relaxed DNA by DNA topoisomerases. Both supercoiled and relaxed DNAs consist of Gaussian distributions of topological isomers with varying superhelix densities. These topoisomers can be separated electrophoretically, although their characterizations are complex. Electrophoresis of cdDNAs in the presence of ethidium bromide, an intercalating agent, converts closed duplex DNAs into positively supercoiled DNAs that migrate electrophoretically as single bands in which relaxed DNA migrates slightly faster than supercoiled DNA. The separation of those bands of DNA can be enhanced by performing the electrophoresis with increased concentrations of Tris-acetate-EDTA buffer or decreased concentrations of ethidium bromide. In this study the separation of supercoiled and relaxed plasmid DNAs in the presence of varying concentrations of ethidium bromide was measured. The optimal separation was observed at a concentration of 0.1 microgram ethidium bromide/ml.

P591 **Cell and Molecular Biology**

Sulfur-dependent selenate accumulation and toxicity in Chlamydomonas

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The aim of this study was to investigate selenate toxicity in the unicellular green algae Chlamydomonas reinhardtii as a function of sulphate concentration. Selenium (Se) and sulfur (S) are essential micronutrients, however Se can be lethal at concentrations as low as 5μM. Se and S are hypothesized to compete for sulfate transport pathways based on chemical similarity. The toxicity of selenate was estimated using transcriptomic and biochemical approaches by challenging wild-type (WT) cells cultured in nutrient-replete and sulfur-deplete media with varying concentrations of selenate (0-25uM). Analysis of DNA microarrays identified putative selenium-responsive transcripts (1.5 log2 FC): transcripts for genes involved in redox metabolism were found to be significantly up-regulated, whereas transcripts encoding proteins essential for sulfur transport: slt1, slt2, and sultr2 showed modest responses in cells exposed to 15 uM Se. Atomic absorption analyses showed 3.75 fold greater selenate accumulation of on a per cell basis (ppm/109 cells) in cells cultured in sulfur-deplete media compared to nutrient-replete media. Additionally, spot tests indicated a 10-fold increase in selenate toxicity (10uM, 1um) on sulfur-deplete plates. These preliminary findings support the model where selenate competes with sulfate for import into the cell. Future work will focus on identifying Seresponsive pathways in Chlamydomonas.

595 **Cell and Molecular Biology**

The effect of resveratrol on phagocytosis

Georgiann Garza*, Rosalie Macias, and Dr. Peter King, St. Edward's University, Austin, TX

Coronary Heart Disease (CHD) remains the leading cause of mortality and morbidity in the United States and other developing countries. Due to the buildup of plaque in the arteries to the heart, CHD is characterized by the inflammatory effects displayed by macrophages and the process of phagocytosis. Numerous studies have attempted to study the role of macrophages in inflammation and the underlying cellular and molecular mechanisms that contribute to atherogenesis [1]. Recently, a number of studies have suggested that a moderate consumption of red wine seems to display a cardioprotective effect in reducing the risk of atherosclerosis, or the hardening of the coronary arteries. Resveratrol, a polyphenolic compound found in the red wine, seems to have this cardioprotective effect. Thus, the effect of resveratrol on phagocytosis of serum-coated beads was studied and quantitated. Furthermore, phagocytosis was induced by both LPS

(lipopolysaccharide) and PMA (phorbol 12-myristate 13-acetate) to engulf uncoated beads. Phagocytosis assays were then done in order to elucidate the effect of resveratrol on all 3 mechanisms of phagocytosis. Results from this study showed that resveratrol still inhibited all 3 mechanisms of phagocytosis. This implies that resveratrol displays a more general effect on macrophage phagocytosis, rather than a specific effect. A moderate consumption of red wine may be cardioprotective in reducing the risk of developing atheromas within the arterial intima, and may be useful in preventing the advancement of atherosclerosis.

609 **Cell and Molecular Biology**

RNA-Seq analysis of phosphate-deprived Chlamydomonas cells reveals aspects of acclimation critical for cell survival

Matthew Wolski*, Miguel Angulo, Charles Hauser, St. Edward's University, Austin TX Arthur Grossman, Carnegie Institution for Science, Stanford CA

The unicellular green alga *Chlamydomonas reinhardtii* exhibits both specific and general responses when experiencing phosphorus (P) or sulfur (S) deprivation. In the present study, the C. reinhardtii transcriptome was characterized from nutrient-replete and phosphate-depleted wild-type and psr1 (phosphorus starvation response) mutant cells. The psr1 mutant is null for the regulatory Myb-like transcriptional regulator critical for acclimation to phosphorus starvation. The transcriptome was analyzed using Illumina RNA-seq to gain insights into the integration of P- and S-starvation pathways. Of the 7-9 million total Illumina reads obtained, 85-92% of the reads were aligned to over 23,000 genes in the *Chlamydomonas* ver 5 reference genome. Phosphate depletion resulted in the up-regulation of 45 genes in wild-type and 189 genes in psr1 cells, respectively by at least 2 fold. Conversely, 36 genes were down-regulated by at least 2 fold in wild-type and 386 genes in psr1 cells. The transcriptome analyses results for wild-type and mutant cells strongly suggest the occurrence of massive changes in cellular physiology and metabolism as cells become depleted for phosphate and reveal aspects of acclimation that are likely critical for cell survival. Further in-depth analysis of the transcriptional regulation is in progress and may shed light on the integration of Pand S-starvation pathways in*Chlamydomonas.*

P610 **Cell and Molecular Biology**

Systems biology approach in *Chlamydomonas reinhardtii* reveals connections between phosphate nutrition and multiple metabolic pathways

Miguel Angulo*, Matthew Wolski, Charles Hauser, St. Edward's University, Austin TX Arthur Grossman, Carnegie Institution for Science, Stanford CA

In this work, we query the *Chlamydomonas reinhardtii* transcriptomic response to phosphate deprivation. Our RNA-Seq data analysis pipeline validated a 2-fold cutoff and 10 RPKM (reads per kilobase per million mapped reads (~1 mRNA per cell) to reveal 45 and 189 up-regulated genes in wild-type and psr1 cells, respectively, and 36 and 386 down-regulated genes. The *C. reinhardtii* PSR1 gene is required for proper acclimation of the cells to phosphorus (P) deficiency. P-starved psr1 mutants show signs of secondary sulfur (S) starvation, exemplified by the synthesis of extracellular arylsulfatase and the accumulation of transcripts encoding proteins involved in S scavenging and assimilation. The S-starvation responses, in P-limited *psr1* cells, also requires the regulatory protein kinase SNRK2.1, but appears to bypass the membrane-targeted activator, SAC1. In addition, the inhibitory kinase SNRK2.2 is necessary for repression of S-starvation responses during both nutrient-replete growth and P limitation. Overall, the work strongly suggests integration of the different circuits that control nutrient-deprivation responses in *Chlamydomonas.*

P611 **Cell and Molecular Biology**

Homology-based construction of a protein interaction network for *Chlamydomonas reinhardtii*

Jesse Farek* and Charles Hauser, St. Edward's University, Austin TX

Protein-protein interaction networks aid in characterizing proteins by modeling their function in biological pathways and regulatory networks. Various computational techniques can be used to derive protein-protein interaction networks, including the identification and comparison of homologous sequences. The INPARANOID algorithm employs this technique by performing pairwise BLAST sequence alignments for sequences from two species and identifying orthologous groups. The construction of protein-protein interaction networks based on homologous sequence infers protein function based on information about homologous proteins from closely related species. In this project, a protein interaction network for the unicellular green algae *Chlamydomonas reinhardtii* was computationally derived by: (1) mapping its proteome against those of Saccharomyces cerevisiae and *Arabidopsis thaliana* using INPARANOID; (2)employ networks from*S. cerviseae* and*A. thaliana* as scaffolds to map conserved *C. reinhardtii* interacting proteins pairs. The constructed network was then visualized using Cytoscape. Of particular interest to the analysis of the derived *C. reinhardtii* protein-protein interaction network are proteins determined to be involved in oxidative stress pathways.

P321 **Chemistry and Biochemistry**

Solubility studies using co-solvent system combinations for a poorly water soluble drug

Senan Rasheed*, Tahir Ismail, Anna Duke* , Kristof Kovacs, Tibor Barcza, Mario Jane*, Ilona Petrikovics

Poor water solubility is one of the main reasons why many potent drug molecules cannot be used efficiently in combating illnesses or diseases. Overcoming the solubility issue associated with these molecules opens the possibility to administer such drugs in pharmaceutically acceptable dosage forms. The purpose of this experiment was to establish the most optimal solubilizing co-solvent combination system that could be used as an administrated solvent for an antidote in combating cyanide intoxication. Combinations of different solubilizers (Cremophor EL plus PEG 400 or PEG 300 in concentrations of 10%, 25%, 50% and 75%) with various cyanide antidote molecule (SD) concentrations (5%, 10%, 15% and 20%) were tested, and the solubility of the SD was determined in each of them using a high performance liquid chromatography (HPLC) method, with UV detection. It was seen that the solubility of the SD increased with the increasing percentage of PEG 300 or PEG 400 in the solubilizing system. The maximum solubility of 12.1% (g/g) was achieved with the highest concentration of SD (20%) in the solubilizing system containing 75% PEG 400. Applying PEG 300 in the same concentration (75%) provided only 10.5% (g/g) solubility indicating the superiority of PEG 400 over PEG 300 in this system.

P323 **Chemistry and Biochemistry**

Novel Grignards: New methodology towards an efficient route to *Fumagillin*

Colby M. Adolph*, Dr. Danette Vines, Schreiner University, Kerrville, Tx

Our group previously attempted the synthesis of a *Fumagillin* analogue subunit starting with commercially available 4-methoxybenzylmagnesium chloride. We believed the resulting Grignard, upon reaction with benzaldehyde, would lead to a direct route to a functional *Fumagillin* analogue subunit. We first attempted the synthesis using the Grignard and various metal catalysts. However, we were unable to achieve the dearomatized subunit without significant decomposition. We decided to modify the Grignard by replacing the para-substituted methoxy ether moiety with a nitro group in hopes that the desired rearrangement would occur more readily through the corresponding Meissenheimer salt complex and meta-directing effects from the nitro moiety. Six experiments to prepare the Grignard from 4-nitrobenzyl bromide were run using varying parameters. The Grignard reactions were executed under anhydrous conditions using magnesium activation techniques including: crushing magnesium turnings, 1,2-dibromoethane, and drops of iodine. Magnesium-halide exchange (transmetallation) was also attempted between 4-nitrobenzyl bromide and 4-methoxybenzylmagnesium chloride. The metal halogen exchange reaction showed slight evidence of new product by 1HNMR with substantial starting material remaining. We report a summary of the results of those reactions.

P340 **Chemistry and Biochemistry**

Silanes as mild reductants for amides involving organic catalysis

Renzo Arias Ugarte, Jorge Martinez*, Keith H. Pannell, University of Texas at EL Paso

We report herein a novel example of silicon chemistry. The reaction between dimethylformamide (DMF) and tertiary silanes, R_3SiH, leads to high yields of the reduced product trimethylamine and the corresponding disiloxane, $R_3SiOSiR_3$>This reaction can be catalyzed by a range of metal complexes. However, we have discovered a previously unknown feature that this reduction proceeds via an intermediate hydrosilylated product, $R_3SiOCH_2NMe_2$. This material further reacts with another equivalent of the silane in a DMF-catalyzed reaction to form the final products. Full data on the concentration dependancy of this chemistry will be presented to outline an unusual example of organic catalyzed silicon chemistry.

342 **Chemistry and Biochemistry**

Dibenzyltindihalides: synthesis, structures, and bioactivity

Alma Miramontes, Alejandro Metta-Magana, Keith Pannell

We have synthesized a series of dibenzyltindihalides, (R-ArCH2)2SnX2 (R = o-Et, o-CH3S and o-CH3O; X = F, Cl, Br, I) from the efficient direct process reaction between metallic tin and the appropriate benzyl halide. The materials have been examined by multi-nuclear NMR including 119Sn and single crystal X-ray diffraction. Their single crystal structures illustrate the capacity of tin to expand its coordination number and act as a Lewis acid. Thus, the materials exhibit Interesting solid state polymeric structures via halogen bridges between neighboring molecules. This structural arrangement is not maintained in solution where monomeric species predominate. Preliminary biological data related to their ability to inhibit cancer cell proliferation will also be presented, results which demonstrate a significant structure/activity relationship dependent upon the substituents on the aryl ring.

P358 **Chemistry and Biochemistry**

A novel application of EMSA and DSLR technology for detecting RecA binding to *Mycobacterium tuberculosis* DNA sequences

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Mycobacterium tuberculosis is a pathogenic bacterium with no known DNA proofreading mechanism, but does use the enzyme RecA to carry out DNA replication and repair via homologous recombination. As a result of these repairs, mutations may be introduced into the sequence. This could explain the rapid appearance of drug resistant strains in populations where proper drug regimens are not administered. We seek to investigate whether RecA favors binding to certain drug-resistant M*tb* DNA sequences. As an alternative to accepted X-ray and phosphorimaging techniques, we will develop a new technique with DSLR camera technology and Image J software to analyze chemiluminescent EMSA gels. Through this technique, the binding affinity of RecA protein to DNA sequences will be quantified. These assays will be used to determine if RecA is attracted to certain nucleotide concentrations, certain nucleotide sequences, or has no preference at all.

428 **Chemistry and Biochemistry**

Changes in the number and position of OH stretching bands associated with substitution of electron releasing and withdrawing groups in phenols

Emily R. Caudill* and J.D. Lewis, Department of Chemistry, St. Edwards's University, Austin, TX 78704

Hydroxyl stretching bands in substituted phenols tend to shift to higher or lower frequency depending on the electron withdrawing or releasing nature of the substituents. These band shifts in FTIR spectra occur due to the OH band's sensitivity to its electronic environment. For a large number of substituted phenols, substitution of an electron releasing group produces a spectrum with a single OH stretching band shifted to higher frequency. Conversely, substitution of an electron withdrawing group typically causes the frequency of the single OH band to decrease. One interesting exception to this trend is 2-tert-butylphenol. Although the tert-butyl group is an electron releasing group, the frequency of the OH band in 2-tert-butylphenol is decreased compared to phenol. Also atypical are the spectra of 4-(trifluoromethoxy)phenol, 2,6-diisopropylphenol, and 2-tert-butyl-6-methylphenol in which two bands are observed, indicating the presence of two stable OH rotamers. In 4-(trifluoromethoxy)phenol the presence of two overlapping bands is especially surprising since the substituted group is not adjacent to the hydroxyl group.

430 **Chemistry and Biochemistry**

Variations in the infrared OH stretching band region associated with substitution of ethanols and propanols

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We have compared the infrared OH stretching bands in a series of dilute solutions of substituted ethanols and propanols in cyclohexane to observe the effect on intramolecular hydrogen bonding and OH rotamer structures resulting from changing the electron donating substituents in these molecules. Electron donor groups studied include methoxy, 2-pyridyl, phenyl, vinyl, fluoro, chloro, bromo, and others. The results were examined for presence or absence of intramolecular hydrogen bonding, changes in the strength of hydrogen bonding, and the presence or absence of the possible "free" OH rotamer structures. The results include many expected frequency shifts for hydrogen-bonded bands and band intensities as well as substitution effects that have less obvious explanations.

P431 **Chemistry and Biochemistry**

Changes in infrared spectra associated with halogen bonding

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The formation of halogen bonds has attracted increasing attention in recent years. We have examined the infrared spectra of selected mixtures expected to exhibit halogen bonding. Our goal in this effort has been to observe shifted vibrational bands indicative of halogen bonding. We have examined the infrared spectra of dilute mixtures of halogen containing molecules such as 2-fluoroiodobenzene and bromobenzene with electron-donor molecules such as pyridine and 1,4-dioxane using cyclohexane as solvent. Although infrared frequency shifts in OH and C=O stretching bands have long been known for hydrogen bonding and are readily observed, the relatively low frequencies of vibrational modes involving halogen atoms complicates any search for analogous band shifts for halogen bonding. This presentation will discuss the challenges and results in our studies thus far.

P488 **Chemistry and Biochemistry**

Lipid and fatty acid composition of prickly pear cactus (genus *Opuntia*) fruits and pads

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Prickly pear cactus (Genus *Opuntia*) is a succulent found in southwestern United States and Mexico. The fruit and pads serve as a food source for humans and animals, including the cochineal insect, which feeds solely on the juices from cactus pads. Cacti were collected from North Texas, and both the fruits and pads had their lipids extracted with organic solvents. Fatty acids were then analyzed by gas chromatography-mass spectrometry (GC-MS) and lipid classes were analyzed using thin-layer chromatography (TLC). In the prickly pear fruits, the most abundant fatty acids in the exocarp were 16:0>20:0>18:0.18:1 while in the seed the profile was 18:2>18:1>16:0>18:0. All fatty acids from the seed were found in the triglyceride fraction. In cactus pads, only 16:0 and 18:2 were found in the pulp. The abundance of unsaturated fatty acids in the seed are typical of plant stored lipids, while the high level of saturated fatty acids in the epidermis is more indicative of the structural role of the lipids.

P500 **Chemistry and Biochemistry**

Extreme makeover chromatin edition: Chromatin remodelers in the postrecruitment regulation of transcription

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The regulation of gene expression in vivo is a complicated process that involves hundreds of proteins. Control of gene expression first occurs at the transcriptional level. Many of the key players in transcription are necessary for remodeling the in vivo template of transcription, chromatin. Chromatin remodeling affects availability of the promoter region as well as the open reading frame to general transcription factors such as TATA Binding Protein (TBP) and RNA Polymerase II (RNAPII). Within the past several years, it has become clear that at some genes TBP and RNAPII associate with promoter DNA long before transcription ensues. The mechanisms controlling these "postrecruitment regulated" genes are largely unknown. Here, our goal was to assess the role of chromatin remodeling proteins in driving transcription after binding of TBP and RNAPII. To identify a potential function of chromatin remodelers in this process, we utilized a plasmid-based screen that artificially tethers TBP to a reporter gene promoter. The screen was performed in *Saccharomyces cerevisiae*, a eukaryotic model organism. The screen revealed that removing proteins that are part of the SWR1 complex results in poor reporter gene expression, despite the expression of tethered TBP in these deletion strains. Interestingly, removing the SWR1-related Ino80 complex or other chromatin remodeling complexes did not result in a phenotype as severe as the SWR1-related deletions. This finding indicates that stimulation of transcription after TBP and RNAPII bind is dependent on the SWR1 complex, and this dependence is largely specific within the group of chromatin remodelers tested.

P543 **Chemistry and Biochemistry**

Effects of pH changes on the charge-discharge properties of lithium manganese nickle oxide spinel cathodes for lithium rechargeable batteries

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Lithium ion batteries are widely used for their high voltage and high energy density compared to other secondary batteries. The application of lithium ion batteries is limited by the specific capacity of the cathode materials. Hence, lithium manganese nickel oxides synthesized at various pH ranges are being investigated for potential higher capacity and high rate capabilities in lithium ion batteries. The synthesis of lithium free metal oxides is accomplished by co-precipitation process. Then followed by a solid-state reaction in which required amounts of LiOH is added and fired at 800°C for 10h in air. The cathode materials are characterized by X-ray diffraction (XRD), Inductively Coupled Plasma (ICP), Thermal Gravimetric Analysis (TGA), and Scanning Electron Microscopy (SEM). The cathode electrode is prepared by casting the slurry of 80% cathode material, 10% Super C45 and 10% polyvinylidene difluoride binder in n-methyl-2-pyrrolidone solvent on aluminum foil. The coin cells are assembled in argon filled glove box with lithium as an anode, 1M $LiPF_6$ (lithium hexafluorophosphate) in EC/DEC (Ethylene carbonate and Diethyl carbonate in 1:1) as electrolyte and Celgard polypropylene as separator. Electrochemical characterizations of the coin cells were performed using charge/discharge profiles and impedance spectroscopy. The XRD showed diffraction patterns corresponding to both layered and spinel phases in the composite materials. The TGA measured an 86.22% recovery of metal oxide particles. The SEM image revealed the presence of a uniform nano-rod formation of 10nm x 20nm dimension. We will report in detail about the electrochemical properties of the high capacity lithium-ion batteries.

P547 **Chemistry and Biochemistry**

Predicting solvent blend miscibility

James Huskey* and Darren Williams, Sam Houston State University, Huntsville, TX

The Hansen Solubility Parameters (HSPs) have proven themselves to be valuable predictors of solvent blend abilities to interact with polymeric surfaces, to remove adhesives, and dissolve poorly-soluble organic compounds. A theoretical approach to predicting the miscibility of the blend components has not yet been developed. This poster presentation will present the background of the Hansen solubility parameters and their utility in predicting solvent blend behavior. The connection of Godfrey's miscibility (M) numbers to the Hansen solubility parameters will be explored, and preliminary results will be presented of a quantitative structure property relationship (QSPR) between HSPs and M-numbers.

P556 **Chemistry and Biochemistry**

A model for the treatment of poly-Q based diseases

Eamonn F. Healy, Carley E. Little*, St. Edward's University, Austin, TX

The genetic basis of the polyglutamine repeat disease family is a CAG trinucleotide repeat expansion in the protein-coding region that results in expression of an expanded polyglutamine domain. Diseases within this family include Huntington's disease (HD), spinal and bulbar muscular atrophy (SBMA), and the spinocerebellar ataxias (SCAs). In these diseases polyglutamine (polyQ) expansion leads to the formation of fibrillar protein aggregates, and ultimately neuronal cell death. It has been determined that for ataxin-3, the causative agent of SCA3, exceeding a threshold of 52 glutamines triggers formation of intranuclear aggregates. The small heat shock protein αB-crystallin has been identified as a suppressor of SCA3 toxicity, most likely through the formation of a transient αB-crystallin/ataxin-3 complex. We have undertaken extensive simulations of the interaction of human αB-crystallin and ataxin-3 in order to determine the most energy-preferred complex. From the predicted complex, the bioactive peptide sequences FSVN and HEER, were identified based on our analysis of vulnerable dehydrons, or solvent-accessible backbone hydrogen bonds. AutoDock was used to run the docking simulations of FSVN and HEER peptide sequences with the ataxin-3 protein. It was found that both the FSVN and HEER sequences complexed with the ataxin-3 in a strikingly similar way as the human αB-crystallin and ataxin-3 complex. This interaction implicates the formation of a weak but effective transient complex.

P563 **Chemistry and Biochemistry**

Production of hydrogen gas by the reaction of hydrochloric acid with elemental copper

Chris Hughes, Pat Larsen*, and Richard Garner, Hardin-Simmons University, Abilen, Texas

General chemistry texts place copper below hydrogen in the activity series of metals, i.e., copper is not oxidized by dilute hydrochloric acid forming hydrogen gas as one of its products. It is known that boiling concentrated hydrochloric acid will oxidze copper resulting in the formation of hydrogen gas. with the reaction being driven by the formation of the $CuCl_2^-$ complex. In work performed in the Hardin-Simmons University laboratory, hydrogen gas has been produced when either concentrated or diluted hydrchloric acid are reacted with elemental copper at room temperature under certain reaction conditions. Furthermore given sufficient time concentrated acid will produce hydrogen gas, albeit slowly, under no special conditions. Similarly the reaction of hydrobromic acid with copper under the same reaction conditions produces hydrogen gas.

P564 **Chemistry and Biochemistry**

Comparison of ability of *P.aeruginosa* to biodegrade diesel, hexadecane, and dodecane in water and soil contaminated with known concentrations of sodium chloride

Jon Ury*, James Walter, Gary Stanlake, and Richard Garner, Hardin-Simmons University, Abilene, TX

In work performed at the Hardin-Simmons University laboratory, *P. aeruginosa* has demonstrated its ability to biodegrade hexadecane and dodecane in salty water. That work has been completed. Current investigations are being continued to compare the efficiency of biodegradation in sterile soil contaminated by diesel, hexadecane, and dodecane with that of aqueous suspensions of diesel, hexadecane, and dodecane contaminated with known concentrations of salt. In addition unsterilized soils found on the campus have individualy been contaminated with the three organic liquids and inoculated with *P. aeruginosa* to ascertain any effect on the bacteria's ability to perform biodegradation.

P565 **Chemistry and Biochemistry**

A comparison of techniques for extracting oils from differing algal species

Toni Cowan*, Gary Stanlake, and Richard Garner, Hardin-Simmons University, Abilene, TX

A number of different techniques are used in the extraction of diesel-like oils from various species of algae. The purpose here is to make a comparative assessment of the efficiency of five extraction techniques. Four diferent types of algae are being utilized in this work, *spirogyra, chlorella, monoraphidium, and ankistrodesmus.*The techniques utilized employ both chemical and mechanical processes. The mechanical processes employ an oil press or magnetic stirrer to rupture cell membranes while using hexane as solvent. The chemical methods include Soxhlet extraction, sonication, and the Bligh and Dyer method using chloroform and methanol followed by distillation of solvents using a Snyder three ball column. Following removal of the solvents, both gas chrromatography, high pressure liquid chromatograraphy, and FTIR will be used to analyze the products for performance and qualitative analysis.

P585 **Chemistry and Biochemistry**

Comparison of acid hydrolysis and enzymatic digestion of biological macromolecules as an initial stage of biogas generation

Tamika Harford*, James Masuoka, Midwestern State University, Wichita Falls, TX

Biofuels, such as methane, represent a renewable source of energy and an alternative to fossil fuels. Efforts to collect existing deposits of methane are being explored, but food waste has the potential to serve as a useful starting material for methane production and recovery. Given the right microbial mix, the microbial breakdown of food can result in methane production for power generation. To maximize efficiency, each step of the process needs to be optimized in terms of growth and reaction conditions. This study focused on optimizing the initial phase of macromolecule degradation. Both chemical and enzymatic approaches have been suggested; thus, bovine serum albumin was used as a model protein to test the efficiencies of acid hydrolysis and enzymatic digestion. Digestion was monitored by tracking the loss of intact protein. Both methods were performed under several experimental conditions, and both presented experimental and practical challenges. Acid hydrolysis showed a significant decrease in protein concentration over a 6-hour period whereas enzymatic digestion did not. Our results demonstrate that protein degradation can be followed to determine optimal conditions and suggest that acid hydrolysis may be more effective than enzymatic digestion as a first step. These methods are currently being adapted for use with polysaccharides, and will be extended to test the degradation of macromolecular mixtures that better reflect the desired input of food waste.

597 **Chemistry and Biochemistry**

Troubleshooting a solvent assay for triclosan quantification

Elizabeth Fawcett, Dr. Kiley P-H Miller

Triclosan is pesticide marketed as an antibacterial used in hand washes and other household products. Its popularity, as an antibacterial, in medical facilities started in the 1970's and then spread to consumer products in the 1990's through protective coating on children's toys. It is currently regulated by the EPA, but there has been a push for tighter standards in recent years. As a more recently discovered antibacterial, triclosan's long term effects on the environment are not well documented. This is a concern, as most triclosan is simply washed down the drain and, due to its chemistry, is most likely not removed in waste water treatment. This leads to trace amounts of triclosan being introduced back into the environment without knowing the potential harm. There is a need to develop an analysis for triclosan that can quickly and efficiently determine triclosan's environmental concentrations. For this analysis, a proper solvent for the triclosan should be selected so that it can be isolated and tested. Research was conducted using gas chromatography (GC) to determine the appropriate solvent. Three different aprotic solvents, acetone, 2-butanone, and dimethylsulfoxide, were tested by spiking samples with environmental concentrations of triclosan and developing a respective standards curve. These solvents were selected because they have differing boiling points, an important factor in GC analysis. The standard curve created for each solvent was tested for data fit. The curve with the best fit will be selected for further analysis and soil sampling will soon commence thereafter.

348 **Computer Science**

A comparative analysis between an analytical method and design software for solving fluid power problems

Tarebi John*, Dr. Jan Brink, Midwestern State university, Wichita Falls, TX

The modern era of fluid power began when oil started to replace water as a pressurized fluid and Blaise Pascal discovered that pressure is distributed equally in all directions in a non flowing system. Fluid power applications are found in aerospace and marine industries, in the extraction industries like mining, logging, farming, and fishing; all manufacturing industries, and so on. Today, fluid power is a part of our everyday life. The design of fluid power systems can involve many tedious calculations, but software, like Automation Studio, has made it possible to design and simulate these complicated circuits before actual construction. Therefore, it is important that we verify the accuracy of such software using analytical calculations. This research project compared the results obtained for the pressure needed to push a load up an inclined plane using an analytical method and Automation Studio software. The authors further compared the results obtained for velocity reduction due to internal leakage of a cylinder. The authors found out that there were small differences between the analytical method and the Automation Studio method. Design software can be used as a reliable design method if used correctly.

P388 **Computer Science**

Predicting a user's next location, given a minimum of four weeks driving data

Gary Phillip, Midwestern State University (UGROW 2012)

The goal of this research is to create a model that predicts the next location of a user given their historical traveling data along with their last location. Historical data such as the user's duration of stay at last location, arrival time, departure time, location (longitude, latitude), and day of the week will be used to predict the user's next location. Information was collected from user's using a BGT – 31 GPS logger. This was done for a period of 45 days, then analyzed using software programs such as Eureka and Weka. The models generated by the software programs demonstrated that the next locaton of a user can be anticipated with at least 85% accuracy, and can be improved if data was gathered for a longer period of time. The research was able to predict the next location of a user taking in account that the user deviated form previously traveled routes.

P483 **Computer Science**

Using SimTraffic

Tommy McLeroy

SimTraffic is a modern traffic system simulation environment. SimTraffic's light timing algorithm times lights dynamically, based on current road conditions, doing away with human error-prone manual traffic light timing. Dynamic light timing and inter-intersection communication are made possible by the "token" based vehicle weighting system. Vehicles are assigned tokens based on their importance. As a vehicle travels through the road system, tokens are added and subtracted to cut down on stop and go traffic and ensure optimal throughput and trip time for each vehicle. Users may easily load in custom road systems that model ones seen in real life. Vehicles behave intelligently according to road conditions such as light colors and the position of other vehicles around them, avoiding collisions and obeying the rules of the road at all times. Vehicles move according to a highly realistic custom physics engine which models acceleration, mass, drag, and air resistance to add perfect authenticity to each vehicle's movements. SimTraffic uses a form of machine learning which optimizes for a road system's effectiveness metric, a measure of throughput and trip time, to determine the best

timing policy for any given road conditions. This intelligent algorithm allows SimTraffic to adapt to any traffic conditions on any road configuration, improving traffic conditions over time.

507 **Computer Science**

Wolfscript: A programming language for Android

Erick W. Bauman, Southwestern University, Georgetown, TX

Wolfscript is an educational programming language designed to be easily learned by anyone proficient with a scientific calculator. The key of the language is simplicity joined with the power of other high-level languages. There are only two data types in Wolfscript so far: numbers and lists of numbers (arrays). Numbers are arbitrary-precision; all numbers are stored as a numerator over a denominator, so all rational numbers can theoretically be represented with no overflow. Strings are represented as arrays of characters, which are stored as numbers. Wolfscript contains all the features one expects from a procedural programming language: if/elseif/else, for/while, and methods. The syntax and IDE are designed for ease of use on any Android phone or tablet. This presentation will cover the design philosophy of the language and the IDE, as well as some of the technical details.

P600 **Computer Science**

Magic lights

Adam Kumm

Magic lights is an simple to use application built for use on a multi touch table. This app allows users to effortlessly turn on/off an outside light source such as a lamp or overhead light without having to physically flip a switch or button. Instead users simply toggle an on/off switch in the application it will send a Bluetooth message to the light telling it to turn on/off. In addition to being able to turn an external light source on/off, Magic lights can also be able to dim the brightness of the light via a slider on the application. As the slider is raised, the brightness of the light increases. As the slider is lowered the brightness of the light decreases.

P602 **Computer Science**

Computational origami: Development of origami bases

Jessica Miller

Myokyo aims to develop a new technique in designing origami bases; by harnessing the power of computational origami, Myokyo equips the user with the tools necessary in order to create an original piece of art. A paper base is to origami what canvas and paint are to other forms of art - though origami is an ancient art, it has blossomed in the last few decades due, in large part, to the mathematical and computational aspects which allow for more complex designs of origami to surface. Making use of the infamous circle packing algorithm, Myokyo carries out every step necessary in order to provide the user with the ability to design complex, original bases. Myokyo provides the user with a blank canvas on which to design a base and, with simple-click-and-create technology, once complete, turns into a printable fold-pattern in one swift step. In developing the base, the designer is immediately prompted to step outside of the box, and create new designs from scratch rather than recreating what previous origami artists have in the past. This concept is refreshing to an art form as ancient as origami and promises inspiration - without doubt, it will breathe life back into paper folding.

314 **Conservation Ecology**

Oak-Juniper Woodlands of Central Texas: A Decade of Change

Adam Duarte (Texas State University), Jennifer L. R. Jensen (Texas State University), Jeff S. Hatfield (USGS Patuxent Wildlife Research Center), & Floyd W. Weckerly (Texas State University)

In central Texas, USA, stands of Ashe juniper (*Juniperus asheii*) have increased in density and encroached outside their historic range on what was oak savanna. As a result of the species perceived negative effects, considerable effort has been devoted to eradicate stands of Ashe juniper across the landscape. However, the federally endangered golden-cheeked warbler (*Setophaga chrysoparia*) requires the presence of mature oak-juniper woodlands for breeding habitat, and loss of these woodlands has been shown to have deleterious effects on multiple facets of warbler recovery. Furthermore, no work has been done to directly quantify the degree of habitat change in the last decade. To assist in prioritizing conservation efforts, we quantified woodland loss/gain and changes in woodland patch metrics across a ten year study period for the entirety of the warbler's breeding range using available geographic information system (GIS) data and Landsat satellite imagery. We found that overall, woodlands in central Texas have not only increased in total area, but have concomitantly increased in patch connectivity. Although newly wooded areas identified here are probably not yet warbler breeding habitat, the habitat patterns we uncovered here appear promising for warbler recovery efforts in the future.

325 **Conservation Ecology**

Impacts of a high intensity wildfire on abundance, movement, and diversity of herpetofauna in the Lost Pines ecoregion of Texas

Donald J. Brown*, Michael R.J. Forstner, Texas State University, San Marcos, TX

In September and October 2011 a high intensity wildfire burned 39% of the 34,400 ha Lost Pines ecoregion in Bastrop County, Texas, USA. We assessed impacts of the wildfire on abundance, movement, and diversity of herpetofauna using drift fence array trap data collected prior to and after the wildfire, and anuran call survey data collected after the fire, on the 1,948 ha Griffith League Ranch. Abundance and movement of Six-lined Race Runners (*Cnemidophorus* [*Aspidoscelis*] *sexlineatus*) and Southern Prairie Lizards (*Sceloporus consobrinus*) were not significantly impacted by the wildfire shortly after its occurrence. A capture-recapture analysis indicated that movement rates were higher in the wildfire zone for Hurter's Spadefoot Toads (*Scaphiopus hurterii*) the following spring. Based on the trap data herpetofaunal species composition was not impacted by the wildfire shortly after the fire or subsequently, during the following spring. However, the anuran call survey data indicated that anuran species richness was higher in the wildfire zone. Collectively, it seems the wildfire had minimal negative impacts on abundance and diversity of herpetofauna in the short-term, a positive result for conservation in this ecoregion. In addition, our study indicated that investigations focused on fire impacts to ground-dwelling wildlife should consider detection probability when drawing inferences concerning abundances, particularly when differences in ground

structure are apparent.

P335 **Conservation Ecology**

Habitat use of *Peromyscus leucopus* during a long-term drought: Indication of a restriction of habitat by a generalist.

Troy A. Ladine, East Texas Baptist University

An 11-year mark-recapture study (2002-2012) was conducted a three locations of the Environmental Studies of East Texas Baptist University (ESA: Marshall, TX 32º33' N; 94º22' W). The first year of the study was the second year of a long-term drought at the ESA. The ESA is located in an ubran ecosystem. Sites were located at distances that should be independent of each other (Site A to Site B - 420m, Site B to Site C 378 m). There were four individual *Peromyscus leucopus* captured at Site A of the ESA during the initial 4 years of the study. There were no captures a Site B during 4 years of trapping. There were 23 individual *P. leucopus* (10 recaptures) captured at Site C during a 3-year trapping period. All but two mice at Site C were captured within 12 m of a beaver (*Castor canadensis*) pond. The two individuals captured at a distance greater than 12 m, both were extremely lethargic and exhibited signs of stress beyond the general stress of trapping. Stress was not exhibited in any other mice regardless of site. This study indicates *Peromyscus leucopus* may restrict its habitat use during periods of long-term drought to areas near a permanent water source.

359 **Conservation Ecology**

Nocturnal or diurnal? Day and night activity patterns of the Georgetown Salamander (*Eurycea naufragia*)

Kira D. McEntire* and Benjamin A. Pierce, Southwestern University, Georgetown, TX

Most salamanders are nocturnal, yet few studies have examined the effect of nocturnal/diurnal activity patterns on sampling and none on permanently aquatic salamanders. In this study, we examined numbers of individuals detected in diurnal and nocturnal surveys of the Georgetown salamander, *Eurycea naufragia*, an endemic spring- and cave-dwelling salamander known from only about 15 sites in central Texas. Once a week for 7 weeks we placed 3 funnel traps into a permanent spring for two 12- hour time periods: one diurnal sample (0700 hr to 1900 hr) and one nocturnal sample (1900 hr to 0700 hr). The order of diurnal and nocturnal samples was randomized. We captured significantly more salamanders in the nocturnal surveys ($P = 0.008$). There was no significant difference in the number of adult salamanders captured during the two time periods ($P = 0.881$); the difference we observed was entirely due to an increased number of juvenile salamanders captured at night ($P = 0.003$). Our results suggest that juvenile Georgetown Salamanders are more active at night. We recommend that researchers surveying for the presence of salamanders in a spring consider using overnight traps. Additionally, researchers investigating larval salamanders should be aware of increased juvenile activity at night and adjust the timing of surveys accordingly.

408 **Conservation Ecology**

The use of ant species as bioindicators

Ann B. Mayo, University of Texas-Arlington

To aid in land management and habitat restoration, the monitoring of good indicator species is essential. A good indicator species can be used as an assessment of ecosystem function and health and is easy to assess. Ants are important and dominant organisms in nearly all terrestrial ecosystems. Thus, the community of ant species has been suggested as a bioindicator and there is increasing evidence that ant species can be used in such assessments. This study investigated the ant community in prairie systems as indicators of habitat type and disturbance. The ant community of 17 different habitats was sampled in the Fort Worth Nature Center in Fort Worth, Texas from March through August 2012. Although there were consistent differences among sites, the results indicate that many ant species may be too flexible for use as bioindicators. Further study is needed to firmly establish the utility of ants as bioindicators in this ecoregion.

P411 **Conservation Ecology**

Potential use of natural melanophore patterns for recognition of individual Georgetown salamanders (*Eurycea naufragia*)

Kira D. McEntire, Jenifer W. Harren*, Alexandria L. Hill*, Rachel C. Cross*, and Benjamin A. Pierce, Southwestern University, Georgetown, TX

Marking and recapturing individual organisms is often important for estimating population size, estimating dispersal, and measuring growth rates in natural populations. However, applying permanent marks to small animals such as aquatic salamanders is often stressful, time-consuming, and expensive. We tested the ability to recognize individual Georgetown salamanders (*Eurycea naufragia*) on the basis of differences in naturally-occurring melanophore patterns on the dorsal surface of the head. Using visual implant elastomers, 90 salamanders at Swinbank Spring and 63 salamanders at Twin Springs were individually marked in the summer of 2010. All salamanders were photographed at the time of marking. Over the next 18 months, we recaptured and photographed salamanders monthly at both sites. Open-source pattern recognition software (Wild-ID) was used to match photographs of recaptured salamanders with the original photographs taken at the time of capture. The use of the elastomere marks allowed us to compare the accuracy of photograph matching. We found that the pattern recognition software correctly matched photographs of most adult salamanders, but was less accurate at matching patterns of salamanders originally photographed as juveniles. Our results suggest that naturally occurring melanophore patterns may be useful for identifying individual Georgetown salamanders.

552 **Conservation Ecology**

Herbivory effects on oak species

Fernando A. Martinez*, Janis K. Bush, University of Texas at San Antonio, San Antonio, Texas

Recruitment failure has been described for many plant communities and is becoming a major concern for conservation biologists and land managers. Many species of *Quercus* (oak) in North America exhibit recruitment failure. Previous studies have reported high *Quercus* juvenile densities, which indicate that seed production, seed germination, and seedling recruitment were not a problem in the past. The browsing of *Quercus* species by herbivore populations is a common occurrence; however the amount or impact of foraging pressure on sensitive oak communities is largely undescribed. The current study evaluated four simulated herbivory treatments (0, 33, 66, and 100% of the total stem length removed) on three *Quercus* species (*buckleyi, fusiformis,* and *sinuata* var. *breviloba*) within the Kerr Wildlife Management Area, west of Kerrville, Texas. In addition, the natural herbivory level was also evaluated. Results indicate similar responses by the three species to the simulated herbivory treatments. Juvenile mortality increased and the measured growth parameters decreased with increasing stem removal. The natural herbivory treatment showed a general herbivore preference for *Q. buckleyi*, and that foliar nitrogen and chlorophyll were lowest in *Q. buckleyi.* Results indicate herbivore pressure may play an important role in determining replacement dynamics of some *Quercus* communities, particularly with high herbivore pressure. In addition, herbivory effects in combination with other factors, such as light levels, may further reduce the recruitment potential of these *Quercus* species. If the goal of managers is to increase the recruitment of *Quercus* juveniles into adult populations, the intensity of herbivore pressure should be considered.

P557 **Conservation Ecology**

Population density and microhabitat composition of the Seaside Sparrow on Laguna Atascosa National Wildlife Refuge, Cameron County, Texas.

Jacqueline Ferrato*, Mark Conway, Michael Small, Joseph Veech, Thomas R. Simpson

A resident population of Texas Seaside Sparrows (*Ammodramus maritimus*) was recently discovered in the Lower Rio Grande Valley (LRGV) of Texas, extending its known breeding distribution further south along the Texas coast than previously described, Currently no population-level data exists for this species in the LRGV. Further, plant associations used by Seaside Sparrows in the region differ from those reported for other populations of this species. We studied a breeding population of Texas Seaside Sparrows on the Laguna Atascosa National Wildlife Refuge to obtain baseline population density estimates and to describe its habitat associations in the LRGV. We estimated using the Daubenmire method. We then assessed the correlation between vegetation parameters (i.e., species composition and plant height) and Texas Seaside Sparrow densities. Density estimates stratified by month were 3.45 sparrows/ha (CV-5.14%, 95%CI=3.14-3.85) for April 2012, 3.99 sparrows/ha (CV=16.7%, 95%CI=2.18-7.30) for July 2012, and 3.10 sparrows/ha (CV=7.76%, 95%CI=2.57-3.74) for October 2012. Pooled estimates across months resulted in a density of 3.43 sparrows/ha (CV=8.58%, 95%CI=2.8-4.2) with a mean cluster size of 1.65 (SE=0.05). The dominant vegetation species were ca. 37%Saltwort (*Batis maritima*), 27% Saltgrass (*Distichlis spicata*), and 24% Sea Oxeye Daisy (*Borrichia frutescens*).

P568 **Conservation Ecology**

Effects of armored catfish on native amphibians in Texas

Cynthia Owsley*, Michael Redman, Chris Distel : Schreiner University

Interspecific effects of introduced armored catfish, *Hypostomus plecostomus*, are poorly known in Texas and globally, although they are known to consume eggs of native Texas fish. Armored catfish are supposed herbivores, although other herbivorous fish have been shown to consume amphibians. Because armored catfish are sympatric in Texas with endemic amphibians and because amphibians are disappearing globally, we tested whether armored catfish could negatively affect tadpoles through predation. In a simple aquarium test we exposed Rio Grande leopard frog (*Rana berlandieri*) tadpoles to one (or zero) armored catfish, both of which were fed *ad libitum*. We measured tadpole survival and growth over one week. Armored catfish had a negative effect on survival both through predation and through non-consumed tadpole deaths. Tadpole growth was also negatively affected. This is the first study to show the negative effects of armored catfish on amphibians.

569 **Conservation Ecology**

Trapping turtles using hoop-nets: Testing assumptions and potential biases

Ivana Mali*, Donald J. Brown, Michael R.J. Forstner, Texas State University, San Marcos, TX

The baited hoop net is one of the most heavily used sampling tools for turtle populations. We investigated potential biases and assumptions associated with this sampling tool, using the red-eared slider (Trachemys scripta elegans) as our primary model species. We sought to determine if trap escape-rates varied by turtle size or sex, if short-term distribution of trapping effort influenced capture success, and if switching bait affected capture and recapture success. Turtle size was not a significant variable affecting escapes from hoop nets, but sex was a significant variable, with only females escaping traps. Number of captures did not differ between high intensity, short duration trapping, and low intensity, longer duration trapping. Switching from fish-based bait to red meat increased capture success at multi-year study sites, but did not significantly increase recapture success. The implications of these findings for turtle population studies will be discussed.

P573 **Conservation Ecology**

Long term population monitoring of Great Blue Heron *Ardea herodias* by citizen scientists on the Cibolo Preserve

D.L. Taylor , Cibolo Nature Center, Boerne, TX and J.W. Pieper, Alamo Area Master Naturalists, San Antonio, TX.

Great Blue Heron *Ardea herodias* are large, relatively reclusive birds that nest and breed in preferential trees near bodies of water. Since 2004, a population of Great Blue Heron, nesting along Cibolo Creek in Boerne, Texas, has been monitored each week through the breeding season by volunteer citizen scientists. By spending several hours each week observing the herons from a distant blind; nest counts, population counts, reproductive success and behavioral data have been collected. Human encroachment through residential and commercial development along the Cibolo Creeks riparian corridor, changes to water quality and quantity, and climate change are all expected to impact the ability of this species to reproduce successfully and sustain the local population long term. The lack of rainfall due to recent drought conditions has negatively affected reproductive success. Continued monitoring will allow impacts to be measured as well as give insight to steps that need to be taken to ensure the continued success of the population.

318 **Environmental Science**

Potential of using Sea Hares as biomonitors of heavy metals in the Laguna Madre, Texas

Zach Badaoui and Frank Dirrigl Jr, Department of Biology, The University of Texas-Pan American

Sea Hares (Aplysia) are free-swimming mollusks that live in the Laguna Madre, Texas. Mollusks are known to hyperaccumulate heavy metals, and sea hares can biomethylate arsenic. Arsenic exists naturally in marine organisms, chiefly as water-soluable organic compounds. As both migrants and residents, sea hares are exposed to heavy metals in water. Water samples and specimens were collected in from Port Isabel and the jetties at Brazos Santiago Pass during periods of high sea hare activity. The bioacummulation of metals among the various tissues of sea hares was analyzed using inductive coupled plasma mass spectrometry (ICP-MS). The distribution of metals among anatomical parts (e.g., gills, siphon, and hepatopancreas) is presented, and the potential for sea hares as bioindicators is discussed.

319 **Environmental Science**

Water quality gradients of nutrients, CDOM, and Phytoplankton along an irrigation canal

Tess Thomas, Itzel Torres, and Frank Dirrigl Jr, Department of Biology, The Univeristy of Texas Pan American

The water quality of irrigation canals in South Texas has received little attention despite the: (1) canals being the only other freshwater watercourses besides the Rio Grande, and (2) use of the canals by wildlife and fishes. An irrigation canal in Hidalgo County was investigated to determine whether water quality gradients of nutrients, colored dissolved organic matter (CDOM) and phytoplankton were present. Over a several month period, field measurements were collected of physicochemical variables including temperature pH, salinity, electrical conductivity, total dissolved solids, and dissolved oxygen. Laboratory analysis included ammonia, nitrite, nitrate, and phosphorus and turbidity. These measures were correlated, and then analyzed statistically to determine the influence of site location and season. The results of this study are presented and implications for understanding the water quality of irrigation canals discussed.

343 **Environmental Science**

Analysis of a 13 year El Paso city rainfall record from fire stations as a function of region.

Nessly Torres, Keith Pannell

The "Storm of 2006" in the City of El Paso was responsible for between $200 - $300 million property and infrastructure damage, mainly in the NW portion of the City which is bisected by the Franklin Mountain Range. It was suggested that distinct City regions could need differing codes for buildings, sewers etc. thus it was appropriate to have a historic record of regional rainfall. None exists, so it was suggested that local Fire stations which in theory each possess a rainguage and records could be used. We will present a 13 year rainfall record and illustrate, and explain, significant regional distinctions.

P345 **Environmental Science**

Development and Implementation of *Sargassum* Early Advisory System (SEAS): Phase 1

Brandon Hill*, SEAS, Texas A&M at Galveston

The work of the Sargassum Early Advisory System (SEAS) is three fold: (1) to refine the details of the loop system that we propose sargassum takes throughout its life cycle, (2) to increase the accuracy of our prediction of this cycle and (3) to create an alternative disposal option of the sargassum after it has washed up on the beaches. Evidence suggests the existence of a loop system that is both wind and ocean current driven. The SEAS predictive model is 90% accurate even when predicting sargassums' arrival 6 months out. This accuracy is due to techniques, including the use of satellite imagery, beach cameras, weather buoys, and oceanic drifters. The use of oceanic drifters, which move like sargassum, has increased accuracy and added evidence to support the existence of the loop system. These drifters have the capability to measure GPS position, water temperature and both vertical and horizontal velocity. The third stage of the research involves finding an alternative use and disposal practices for the beached sargassum. The aim is to change the community perception of sargassum, where it is viewed as a critical component of the marine environment.

P346 **Environmental Science**

Investigation of the Gulf of Mexico as a nursery ground for Sagassum

Kirsten Stokes, Houston, TX, Texas A&M University at Galveston

The Texas Gulf Coast consists of 367 miles of coastline, the vast majority are light brown sandy beaches. The slight slope of these beaches creates many large expanses of beach where the public can enjoy a variety of activities, such as beach combing, surfing, swimming, and surf fishing. Sargassum, commonly known as seaweed, can create a significant barrier to tourist trying to enjoy the beach and surf zone. Texas coastal managers struggle to keep the beaches relatively clear of Sargassum. Many of the Sargassum episodes appear with little or no warning. Each episode of the Sargassum can last days, weeks, or months specifically during the tourist season. Texas A&M University at Galveston scientists, have been investigating the use of Landsat Data Continuity Mission (LANDSAT) Imagery to measure the amount of Sargassum that enters into the Gulf of Mexico through the Yucatan Strait versus the amount that exits the Gulf of Mexico through the Florida Strait. The surface currents are provided by the Gulf of Mexico Loop Current. These two areas of investigation are covered by four satellite footprints that cover virtually 100% of the entrance and exit into the Gulf of Mexico. When Sargassum is present these images will produ **c**e green irregular lines that provide exact location of the slicks. Between 1985 and 2012 there is a visual increase of Sargassum as it exits through the Florida Straits supporting the theory that the Gulf of Mexico is a nursery for Sargassum.

P349 **Environmental Science**

Do landscaping choices make a difference on *Midwestern State University* campus buildings?

Wenisha Gabriel, Midwestern State University, Wichita Fall, TX

This study focuses on whether different landscaping features have an impact on the heating and cooling patterns of the buildings around the Midwestern State University campus. Buildings around campus that had either grass, bushes, concrete, or asphalt were identified and observed. It was believed that those buildings which had vegetation (grass, or bushes) right to the buildings would heat up slower and cool off quicker than those buildings that had concrete or asphalt adjacent; they would not require as much energy for cooling. It was also anticipated that although the concrete would retain heat, asphalt would heat up quickly and retain more heat than the concrete. Bushes were expected to heat up the slowest and cool off the quickest. In an effort to test these hypotheses, an eight hour observation (0800-2000hrs) was done over selected buildings. Selected buildings shared similarities (observations were made on the same side of the buildings with similar height that received same amount of sun illumination at the same time). Data collected does show asphalt as the poorest choice to have adjacent to the buildings; bushes appear to be the most effective landscaping option. Based on these results, a side experiment was conducted in which a white reflective surface was placed over asphalt and comparisons determined that a white reflective surface would provide a cooling effect compared to asphalt. The research conducted indicates that the type of landscaping features used around the buildings do affect the heating and cooling patterns of the buildings.

P353 **Environmental Science**

Relationship Between Avian Abundance and Measures of River Impairment in Central Texas

Chad S. Sundol*, Anna K. Boeck, Janis K. Bush The University of Texas at San Antonio, San Antonio TX, 78249, Ryan Bass City of Boerne, Upper Cibolo Creek Watershed Coordinator, Boerne, TX, 78806

The Upper Cibolo Creek in Boerne, Texas has been cited multiple times since 1999 as impaired by the Texas Water Quality Inventory. This impairment led to the formation of the Upper Cibolo Creek Watershed Partnership (UCCWP) whose purpose is to restore water quality along the Upper Cibolo Creek. To assist the UCCWP, a survey of avian fauna was undertaken to determine if a correlation between avian abundance and impairment indicators exists. In October and early November, four ten-minute modified point counts were completed by two independent counters at four locations along the Upper Cibolo Creek near Boerne, Texas. Using previously collected water sample data, correlation analysis was performed between mean number of birds, total Kjeldahl nitrogen, and total phosphorous. Mean number of birds and total Kjeldahl nitrogen showed a significant positive correlation ($N = 4$; $p < 0.0270$; $r = 0.97$). Mean number of birds and total phosphorous showed a positive correlation ($N = 4$; $p < 0.06$; $r = 0.94$). Within the Cibolo Creek Watershed, Kjeldahl nitrogen and total phosphorous showed a significant positive correlation ($N = 14$; $p < 0.0001$; $r = 0.6089$). With positive correlations between avian community abundance and water impairment indicators, further study needs to be conducted to determine if the birds are a point source of contamination of the Upper Cibolo Creek watershed.

370 **Environmental Science**

The effects of carbon dioxide on milkweed (Asclepiadaceae) and monarch butterfly (*Danaus plexippus*) larva

Terri J. Matiella, Ph.D., Janis K. Bush, Ph.D., University of Texas San Antonio

The effects of two levels of carbon dioxide (ambient and elevated) on the the growth of two species of Asclepiadaceae (Milkweed) and the effects on *Danaus plexippus* (monarch butterfly) larva were examined. Plants were grown under differing carbon dioxide levels for 11 weeks, and various growth parameters and plant foliar chemistries measured. *Danaus* larva was monitored for feeding preference and 3rd instar weight, mean weight from 3 rd to 5th instar, and the length of pupation was measured. *Asclepias curassavica* showed significantly greater above-, belowground, total dry mass, height, leaf numbers, and surface leaf area under elevated carbon dioxide conditions than in ambient levels, with significant decreases in dry latex weight and total foliar cardenolide content. There was no significant difference in percent nitrogen or chlorophyll content. For *Asclepias tuberosa* the only significant differences seen were increased height, leaf surface area, and decreased chlorophyll content under elevated carbon dioxide treatments compared to ambient levels. *Danaus plexippus* larva did show a significant feeding preference between species, preferring *A. curassavica* over *A. tuberosa*, but no significant preference between carbon dioxide treatments. When reared on plant tissue, 3rd instar weights were signficantly higher for larva reared on *A. curassavica* over *A. tuberosa.* Mean larva weight from 3rd to 5th instars showed a significant decrease for those fed *A. curassavica* grown in elevated carbon dioxide compared to those fed ambient tissue.

391 **Environmental Science**

Development of a healthy watershed protection plan in the Upper Llano River Watershed, Texas

Emily Seldomridge*, Tom Arsuffi, Donn Edwards, and Preston Bean, Llano River Field Station, Texas Tech University, Junction, TX

The Llano River, a clear, spring-fed perennial river and major tributary of the Colorado River, is a true gem of the Texas Hill Country. The pristine nature of the watershed and relatively constant flow of the springs support a unique ecosystem; however, aquifer withdrawals, invasive species encroachment, land fragmentation, and loss of riparian habitat threaten the health of the watershed. In an effort to protect and maintain the ecological integrity of the Upper Llano River, the Texas Tech University Llano River Field Station (TTU-LRFS) and Texas Water Resources Institute (TWRI) are working with the South Llano Watershed Alliance (SLWA) and others to develop and implement a Healthy Watershed Protection Plan (WPP) through a federal Clean Water Act 319(h) grant from the Texas State Soil and Water Conservation Board and the U.S. Environmental Protection Agency. An integrated assessment of the landscape condition, biotic condition, chemical/physical parameters, and critical watershed functional attributes will be conducted to address the complexity of the watershed. The WPP will also identify land use and cover, current and potential water needs, water yields from implementation of best management practices (BMP), invasive hydrophyte control and impacts, and watershed education components (including programs for K-12 and adult education). Additional components of the WPP include wildlife concerns and compatibility to the project, economics of BMPs, landowner interest/cooperation, types of treatment measures needed/recommended, and an implementation schedule. Understanding these dynamic linkages in the Upper Llano River will protect the watershed for future generations while providing a national example of proactive watershed protection.

P407 **Environmental Science**

Photosynthetic characteristics of *Ascplepias curassavica* under current and predicted increased levels of atmospheric carbon dioxide.

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It has been found that tropical plants possessing C_3 metabolism experience significant increases in apparent quantum efficiency and photosynthetic rate when exposed to increased levels of CO_2 (Ziska et al. 1991). In this study, the effects of reciprocal changes between ambient and elevated CO_2 levels on photosynthetic characteristics of a tropical C_3 plant, *Asclepias curassavica,* were measured at UTSA. Plants were grown in ambient (400 µmol CO? mol?¹) and elevated CO_2 (700 µmol CO? mol?¹) and then their photosynthetic rates measured in ambient (400 µmol CO? mol?¹) and elevated CO_2 (700 µmol CO? mol?¹). There were significant differences between photosynthetic rates, light compensation points, and maximum photosynthetic rates of plants grown and measured in elevated CO_2 levels and plants grown or measured in ambient levels. There was a significant difference in respiration between plants grown in ambient CO_2 and a significant difference between plants grown in different CO_2 levels and measured in elevated CO_2. The results for this study contain implications for how *A. currassavica* abundance, growth, and gas-exchange characteristics may be affected by increased levels of CO_2 in the atmosphere and how the distribution and abundance of the monarch butterfly (*Danaus plexippus*) could change in response to those effects.

456 **Environmental Science**

Differential impacts of organic and synthetic pesticides on the non-target organism *C. elegans*

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Pesticides are widely used agriculturally and domestically. They can be organic or synthesized to mimic effects of organic pesticides. Synthetic pesticides typically persist longer in the environment (Davies 2007). Pesticides are absorbed into soil and affect non-target soil-dwelling organisms such as *Caenorhabditis elegans,* a microscopic nematode. Earlier studies have indicated severe neurological deficits in *C. elegans* and *Apis mellifera* (honey bee) following exposure to cypermethrin or imidacloprid, both neurotoxins (Davies 2007, Mandapat 2008). In this study, we compared the effects of the organic pesticide, pyrethrum, to its synthetic counterpart, cypermethrin, and examined the effects of combining pyrethrum with an organic synergist, parsley seed oil (PSO), a common agricultural practice. OP50 *E. coli* was prepared with each pesticide (pyrethrum, pyrethrum+PSO, cypermethrin) at the highest sub-lethal concentration (5 µg/mL). After *C. elegans* cultures were exposed, motility and lifespan were assessed. Motility was assessed *via* thrashing assay, in M9 buffer. Cypermethrin reduced thrashing by 19% versus pyrethrum by 15%. Pyrethrum+PSO reduced thrashing by 24%. Impact on lifespan was determined by age-synchronizing worms, exposing them to pesticide, then transferring them to egg-laying inhibitor plates. Eggs treated with pyrethrum+PSO did not hatch during exposure, suggesting high vulnerability early in life. Cypermethrin impacted survival more than pyrethrum (42% *vs* 56% at day 8). Our data suggests that both synthetic and organic pesticides have detrimental effects on motility and lifespan of *C. elegans,* but cypermethrin has a stronger negative effect. Addition of the synergist PSO increased the detrimental impact of pyrethrum. These factors can be considered in environmentally conscious agricultural practice.

P462 **Environmental Science**

Effects of large vertebrate herbivory on *Acer grandidentatum*

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Factors affecting growth and survival of first year *Acer grandidentatum* seedlings were considered. A portion of the woody plant community at Lost Maples State Natural Area in the Edwards Plateau region of Central Texas was examined using the quadrat method. Transects were established within a thirty year old deer exclosure and at two adjacent sites, one xeric and one mesic, and community composition was compared. Fifteen first year seedlings were planted in the deer exclosure and fifteen in the xeric site. Growth and survival rates were monitored for one year. In terms of density and basal area, the community within the exclosure was dominated by *Quercus buckleyi, A. grandidentatum, and Juniperus asheii*. The mesic site was dominated by *Platanus occidentalis, Diospyros texana,* and *Prunus serotina,* while the xeric site contained primarily *Juniperus asheii.* The exclosure had the highest density of seedlings, saplings, and mature *A. grandidentatum.* Seedlings planted inside the exclosure survived at a greater rate than those outside the exclosure, though relative growth rates did not differ. Herbivory has the potential to affect seedling growth and succession both through direct damage and by altering abiotic conditions such as available light and competition, and seems to be a cause of *A. grandidentatum* recruitment failure in Central Texas.

463 **Environmental Science**

Community succession in a tallgrass prairie following bioremediation of a crude oil spill

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In 1999, a crude oil spill occurred in tallgrass prairie vegetation at The Nature Conservancy's Tallgrass Prairie Preserve (TGPP) in Osage County, Oklahoma. Bioremediation consisting of fertilization and tilling or only tilling was performed from May 1999 to October 2001. However, vegetation surveys that were resumed in 2011 suggested that the spill zone still differed substantially in plant growth and community composition when compared to a tilled control site and 38 undisturbed prairie sites. Preliminary analyses also suggested that total hydrocarbon levels (consisting primarily of nonvolatile or semivolatile compounds) were substantially higher in all samples from the spill zone than in the tilled control. In this study, we apply improved hydrocarbon extraction techniques to thoroughly sample the spill site and 22 prairie control sites for total petroleum hydrocarbons. Further, we apply direct gradient analysis to determine fine scale relationships between variation in total hydrocarbons and plant species composition within the spill zone to test the hypothesis that poor community recovery is correlated with soil hydrocarbon concentration. These analyses have suggested that soil hydrocarbons continue to be associated with plant species that typically indicate a recent disturbance including a high proportion of exotic species, such as Bermuda grass (*Cynodon dactylon*).

475 **Environmental Science**

Population dynamics and distribution of Diamondback Terrapin (*Malaclemys terrapin*) in West Bay Galveston, Texas

Abby Marlow (University of Houston Clear Lake, School of Science and Computer Engineering) and George Guillen (University of Housotn Clear Lake and Environmental Institute of Houston)

Diamondback terrapin (*Malaclemys terrapin)* is a species of turtle that inhabits brackish water salt marshes along the East and Gulf Coasts of the United States from Massachusetts to Texas. Terrapin exhibit high site fidelity and variable densities which has not helped their populations. Human activity and development on coastal marsh lands including terrapin nesting areas have had a detrimental impact on these animals since the early 1900s and continues to contribute to their decline. The International Union for the Conservation of Nature and Natural resources lists the status of diamondback terrapin as a "lower risk/near threatened" but this status needs updating. Local and range wide extirpations is highly likely if habitat loss and associated stressors are not curtailed. Critical information is needed on trends in local populations of terrapin. To evaluate population densities and short term trends in population size we conducted a mark recapture study during 2008 to 2012. We estimated the local population size of terrapin using a Jolly Seber mark recapture model. Terrapin were marked using a combinations of pit tags and notched carapace. The population size of terrapin was estimated at three areas in West Bay, which is part of the Galveston Bay system in Texas. A comparison of short-term movement patterns and relative threats to small insular versus large island populations of terrapins are also provided. Our study is the first attempt to estimate local populations along the Texas Coast.

P484 **Environmental Science**

Arsenic-induced stress indicators in the seagrass, *Thalassia testudinum*

Peter Cerda*, Yesenia Cerino, Marlon Duran, Esteban Triplett, Mike Persans and Hudson DeYoe

Seagrasses, like many other plants are routinely stressed by natural (salinity, temperature, light) and anthropogenic (pollutants) factors. More specifically, oxidative stress can, but not always lead to plant death, therefore it would be very useful to have a cheap, reliable indicator of this stress in seagrass. Oxidative stress can be assessed by stress damage indicators like TBARS, by enzymatic activity like Catalase and by effects on the PSII of the light reactions of photosynthesis. We applied a known stressor, arsenic, to the seagrass *Thalassia testudinum* in microcosms to see if the above stress indicators responded similarly. Plants were exposed to sodium arsenite at four levels (0, 5, 10 and 15 micromolar) and sampled for six days. TBARS and Catalase data did not show an increase after 6 days of arsenic exposure, however, PAM fluorometry did have a decreasing Fv/Fm response with increasing arsenic level after 2 weeks. The difference in time of exposure may be responsible for the difference in the parameter responses. Treatment with arsenic may have to be extended to 2 weeks or more for the TBARS and Catalase activity to be indicative of a stress response by arsenic in the seagrass.

P485 **Environmental Science**

Potential effects of destratification on the phytoplankton of the Arroyo Colorado

Diana Huallpa and Hudson DeYoe

The Arroyo Colorado is a highly eutrophic distributary of the Rio Grande. Due to excessive nutrient loading, tidal influence and channel morphology, 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 in the past. In an effort to reduce the chance of fish kills, environmental engineers are considering destratifying portions of the Arroyo by use of large solar-powered pumps. Before large-scale trials are attempted, we performed a series of microcosm experiments to determine the short-term effects on the phytoplankton of mixing these water layers. It was anticipated that three factors- nutrient, salinity and hydrogen sulfide levels would be important in determining phytoplankton abundance. Top and bottom water from the Arroyo were collected and combined in different proportions (1 top/0 bot, 0.75 top/0.25 bot, 0.50 top/0.50 bot, 0.25 top/0.75 bot, 0 top/100 bot). In one trial, the bottom water was aerated prior to making the mixtures. As the proportion of bottom water increased, phytoplankton abundance as measured by *in vivo* fluorometry decreased. In mixtures, aerated bottom water slightly alleviated the drop in abundance suggesting that hydrogen sulfide negatively affected phytoplankton growth. Aerated bottom water alone did produce phytoplankton growth indicating that viable propagules were present.

P492 **Environmental Science**

Is arsenic tolerance in marine *Streptomyces* due to the presence of arsenic resistance genes *arsA*, *arsB*, and *arsC*?

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Streptomyces are Gram-positive bacteria typically described in soils. They are known for producing secondary metabolites (e.g., antibiotics, pigments), they are used in biocontrol experiments against fungal plant pathogens, and many *Streptomyces* display tolerance against soil contaminants. Less is known about marine *Streptomyces*, especially their tolerance toward toxins and their production of secondary metabolites. The research objective was to determine whether arsenic tolerance observed in *Streptomyces* was due to the presence of genes *arsA*, *arsB* and/or *arsC*. Arsenic-tolerant *Streptomyces* were isolated from a hypersaline estuary mildly impacted with arsenic, the Laguna Madre. Sediment *Streptomyces* were grown on Starch Casein Agar (SCA) amended with 0.001 M sodium (meta) arsenite (AsIII) or sodium arsenate (AsV). Eight (8) isolates were evaluated for their ability to tolerate arsenic. Isolated *Streptomyces* were also grown in liquid cultures amended with arsenic so that growth and protein production could be quantified. After the cultures were tested for arsenic tolerance, isolates with the greatest tolerance were screened for the *arsABC* genes using PCR and gel electrophoresis. Results showed that most isolates tolerated arsenate up to 0.024 M when grown on solid agar media but did not grow well at arsenite concentrations above 0.001M. Growth and protein production in liquid cultures decreased as arsenic concentration, especially in cultures with arsenite. PCR revealed the presence of at least one ars gene,*arsB*, which encodes for a membrane-bound, arsenite efflux transporter in some prokaryotes. This suggests a potential mechanism for arsenic tolerance in marine *Streptomyces* from the Laguna Madre.

511 **Environmental Science**

Altered gene expression following exposure to the pesticide imidacloprid: possible basis of inherited learning deficit in *C. elegans*

Linda Armstrong*, Dr. He Liu, Dr. Fidelma O'Leary, Saint Edward's University, Austin, TX

In the U.S, pesticides are used on 900,000 farms and in 70 million households with little known about the consequences of long-term use (Delaplane 1996). Many pesticides are neurotoxins, targeting neuronal mechanisms of pest organisms, but non-pest organisms are also affected. Furthermore, continued use may have adverse ecological consequences to agriculture, biodiversity, and human health. Pesticide exposure has been linked to Colony Collapse Disorder in bee populations (Bortolotti *et al* 2003), and to an increased incidence of Parkinson's disease in humans (Betarbet *et al* 2000). The present study examines the heritability of neurological deficits previously shown to be induced in *Caenorhabditis elegans* by exposure to the pesticide Imidacloprid. Imidacloprid binds the nicotinic acetylcholine neurotransmitter receptor (nAchR) in insects. This commonly used pesticide seeps into the soil, which is the habitat of *C. elegans*. The neurological deficit previously identified is a reduction in the ability to acquire long-term associative memories, thus failing to remember where their food sources were (Mandapat *et al*, 2002). Three generations of *C. elegans* were trained and tested for memory acquisition, while only the first generation was exposed to the pesticide. Results indicated that the learning deficit observed in the pesticide-exposed first generation was passed down to two subsequent, unexposed, generations. Furthermore, the large numbers of offspring impacted suggest that the deficit is inherited *via* an epigenetic mechanism. In order to understand the genetic mechanism impacted by this neurotoxin, RNA has been extracted from exposed and control worms and expression levels will be determined using microarray-analysis.

P525 **Environmental Science**

16S rRNA identification and genetic characterization of putative arsenic-oxidizing bacteria from the Lower Laguna Madre of South Texas

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Anthropogenic chemicals (e.g., arsenic) may be present in the Laguna Madre, a hypersaline estuary, due to agricultural runoff, illegal disposal, and other inputs along the USA-Mexico border. Arsenite-oxidizing bacteria transform arsenite (AsIII) to arsenate (AsV), which is a less bioavailable, less toxic form of arsenic. The research objective was to characterize and identify a collection of putative arsenic-oxidizing organisms using known genes. Microorganisms (n = 14) were identified through Polymerase Chain Reaction (PCR)-amplification of 16S rRNA genes. Resulting 16S rRNA sequences were queried against genome databases to identify the organisms. Although the bacteria were morphologically and phenotypically similar, identification of organisms revealed several gram-positive *Bacillus* species and a variety of gram-negative species, including opportunistic human pathogens (e.g., *Vibrio*, *Enterobacter*, *Klebsiella*). Isolates were screened for known arsenite oxidation genes. Results showed that several isolates contained multiple *aox* genes, including *aoxA*, *aoxB*, *aoxC*, *aoxD*, *aoxR*, and *aoxS*. One arsenite-tolerant organism did not contain any known *aox* genes, which suggests that this organism does not oxidize arsenic but utilizes some other detoxification pathway. We conclude that Laguna Madre sediments are inhabited by arsenite-tolerant bacterial communities that are potentially important in arsenic detoxification in the ecosystem. However, the organisms may use different pathways to tolerate arsenite toxicity.

P548 **Environmental Science**

Influence of calcium concentrations and acidity on shell growth and formation in the freshwater snail, *Planorbella trivolvis*

Francis Horne, Biol. Dept., Texas State University, San Marcos, Texas

Global warming efffects on calcium cycles of aquatic environments are being perturbed by increase in carbon dioxide emissions. Slight changes in pH (0.1) in the ocean tend to impact coral calcification much more than mollusk shell formation. Precipitation and dissolution of shell aragonite in water is described by the chemical reaction: $Ca^{2+} + CO^{-2} \leftrightarrow CaCO_3$ while the aragonite saturation state is the product of dissolved calcium and carbonate ($([Ca^{2+}] \times [CO_3^{2-}]) / [CaCO_3] = \Omega$). Changes in Ca^{2+} or CO^{-2} concentrations influence shell mineral formation. Solubility products of $\Omega > 1$ or $\Omega < 1$ indicate water is supersaturated or under saturated and shells tend to form if $\Omega > 1$ & dissolve if $\Omega < 1$ with respect to aragonite. Freshwater mussels and snails are less sensitive to low ion concentrations, and grow in pH neutral and slightly acid waters if bicarbonate and calcium concentration are adequate. Carbonic anhydrase apparently assists in maintaining adequate carbonate concentrations. Altering concentrations of calcium or carbonate impinges on the amount of shell aragonite formed. Acidity lowers carbonate ion concentrations thus shifting the equation to the left toward dissolution of CaC0. Our study will discuss the influence of calcium concentrations and pH on growth and shell formation in the freshwater snail, *Heliosoma trivolvis*. Growth and shell formation will be related to pH and calcium levels in South Plays Lakes.

P558 **Environmental Science**

Investigation of the Gulf of Mexico as a nursery ground for sargassum

Kirsten Stokes, Houston, TX, Texas A&M University at Galveston

Because Sargassum deposition on beaches can affect tourism, Texas A&M University at Galveston scientists have been investigating the use of Landsat Data Continuity Mission (LANDSAT) Imagery to measure the amount of Sargassum entering the Gulf of Mexico through the Yucatan Strait versus the Gulf of Mexico through the Florida Strait. The surface currents are provided by the Gulf of Mexico Loop Current. These two areas of investigation are covered by four satellite footprints that cover virtually 100% of the entrance and exit into the Gulf of Mexico. When Sargassum is present these images will produ**c**e green irregular lines that provide exact location of the slicks. Our results show that between 1985 and 2012 there is a visual increase of Sargassum as it exits through the Florida Straits supporting that the Gulf of Mexico is a nursery for Sargassum.

571 **Environmental Science**

A geochemical and microbial diversity survey of a natural iron seep within Big Bend Ranch State Park

Julia Green*, Jackie Denson, Sul Ross State University, Alpine, TX.

Big Bend Ranch State Park, the largest state park in Texas, covers over more than 300,000 acres of the Chihuahuan Desert. While most surface features in this rugged, remote, and unpopulated setting are volcanic, underlying sedimentary features are found throughout the area. The presence of an orange biofilm containing a matrix of microbial sheaths was observed at two distinct springs within the park, Las Cuevas Amarillas and Ojo Mexicano. These springs are associated with dilute hydrocarbons and iron oxides within the water. This study presents the results of a geochemical and molecular ecology analysis of the Las Cuevas Amarillas site in order to better understand the microbial consortia and metabolic strategies associated with these unique surface features. Total DNA was extracted from the biofilm matrix and universal primer set combinations (Bacteria 27F, 1470R, 1525R) (Archaea A8F, A800R, A1041R) were utilized to amplify 16S rRNA genes. These amplicons were subsequently cloned, sequenced, and phylogenetically analyzed. Quantitative PCR was performed utilizing a variety of primer sets specific to unique microbial metabolic strategies (ammonia oxidation, methane oxidation, sulfate reduction, methanogenesis, iron reduction, iron oxidation, sulfur oxidation) to further reveal the uniqueness of the microbial consortia associated with these sites.

574 **Environmental Science**

Malathion uptake in armored catfish

Jake Crawley*, Jadher Abad, Chris Distel : Schreiner University

Exotic armored catfish, *Hypostomus plecostomus* (among other species), have been introduced into streams in Texas and globally. However, their ecological interactions remain largely unknown. Malathion is one of the most common insecticides in surface water. It is a cholinesterase-inhibitor, a class of insecticides which often leads to reduced or aberrent behavior in aquatic vertebrates. We evaluated the uptake of malathion, in these fish to determine whether they are likely to be affected by this or similar pesticides. Malathion body burden was evaluated through thin layer chromatography. Our results are the first to show outcomes of malathion exposure on armored catfish. We present implications for biological interactions.

583 **Environmental Science**

In situ salinity effects on the Carolina wolfberry (*Lycium carolinianum*)

Kelsey Pearman, Ashley Bogrand, Ella Grace Borne, Niki Ragan and Jeffrey R. Wozniak, Sam Houston State University, Huntsville, TX and Elizabeth Smith, International Crane Foundation, Corpus Christi, TX

The supply of freshwater to estuarine ecosystems is a critical factor in maintaining the overall health and organization of coastal marshes. The combination of decreased precipitation, reduced freshwater inflows and tidal oscillations can lead to hypersaline conditions across the coastal margin, which can exert substantial salt stress on coastal vegetation. Here we review the spatial and temporal trends in the phenology of the Carolina wolfberry (*Lycium carolinianum*) at the Aransas National Wildlife Refuge (ANWR) during the exceptional drought of 2011. Our results indicate that wolfberry plants had a significant negative response to the hypersaline conditions of 2011. Through collecting plant morphological data along 100m transects, we found that wolfberry plants were completely denuded of leaves during the height of the drought (October 2011) and showed a slow increase in the number of leaves per plant from December, to February and March (3.3, 18.6 and 72 leaves/plant, respectively). The coastal marshes of ANWR are home to the last wild migratory population of endangered Whooping Crane (*Grus americana*), which feeds on wolfberry fruit during their time at ANWR. Historically, peak wolfberry fruit abundance occurs in October to November, a time that directly correlates with the arrival of the Whooping Crane to the Texas coast. In October and November of 2011 wolfberry plants had 0 fruit/plant at all of our research sites. However, plants did eventually produce a limited number of fruit in March (~1.5 fruit/plant), which may have provided an energy subsidy to the cranes prior to their migration from the ANWR.

589 **Environmental Science**

Landscape level patterns in saltmarsh pond salinity at Aransas National Wildlife Refuge

Niki Ragan*, Ashley Bogrand, Ella Grace Borne, Kelsey Pearman, Jeffrey R. Wozniak, Sam Houston State University, Huntsville, TX, and Elizabeth Smith, International Crane Foundation, Corpus Christi, TX

The coastal saltmarshes of the Aransas National Wildlife Refuge (ANWR) are directly impacted by a unique collection of both natural and anthropogenic drivers. Specifically, the impacts of sea-level rise, modified freshwater inflows, increasing temperatures, and drought can exert considerable stress on saltmarsh ecosystems and the organisms which inhabit them. Here we review the spatial and temporal trends in saltmarsh pond salinity from the 2011 drought through the winter of 2012 at three sites (Sundown Bay, SD; Pump Canal, PC; and Boat Ramp, BR) along the ANWR coast. During peak drought conditions in August of 2011, pond salinities were elevated at all three of our study sites (SD=55.37ppt, PC=75.85ppt, BR=44.27ppt) in comparison to the adjacent San Antonio Bay (35ppt). At this time over 30% of the ponds were completely dry and in ponds with water, salinity ranged from 40.79ppt to 140.68ppt. As drought conditions began to subside in February 2012, freshwater discharge into San Antonio Bay began to increase. This lead to a decrease in both bay (22.5ppt) and pond salinity at all sites (SD=31.79ppt, PC=21.16ppt, BR=23.53ppt). These data illustrate the presence of a hydrologic connectivity gradient between bay water and the marsh surface. Furthermore, temporal trends in individual pond salinity indicates that particular ponds may experience greater connection to bay water, while others are isolated and only experience periodic connection to the bay. Determining the duration and frequency of these connection events is critical to our understanding of saltmarsh vegetation dynamics, nutrient cycling, as well as overall saltmarsh function.

331 **Freshwater Science**

Possible competition between two congeners; Endangered *Gambusia nobilis* and invasive *Gambusia geiseri* in a reconstructed desert wetland habitat, Balmorhea State Park, Texas

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Introduced species are currently listed as the second greatest threat to earth's ecosystems and biodiversity. Invasive species can negatively impact natives by predation, competition, and hybridization. In Texas, the Large Spring Gambusia (*Gambusia geiseri*) has been introduced throughout the Chihuahuan Desert. Since its introduction it has successfully invaded many spring habitats, and in some cases it may be competing with a native Gambusia, *Gambusia nobilis*. Within a newly reconstructed desert wetland habitat, recent population data suggest that the invasive species outnumbers the endangered two to one. Additionally, data taken from seasonal gut contents shows a high diet overlap between the two congeners. Both the number of invasives and high diet overlap are indicative of competitive interactions that could possibly be driving down the population of the endangered species. To further test for possible competitive interactions between the two species, we conducted a five week competition study using experimental mesocosms. Herein, I will report on resource availability and fish growth from this competition experiment. Not only will this study provide insight into competition dynamics within this specific spring ecosystem, it will also contribute to the overall knowledge of invasive species management.

347 **Freshwater Science**

Salinity preference, tolerance, and osmoregulatory capacity of the fully aquatic salamander, *Amphiuma tridactylum*

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Amphibians are highly vulnerable to environmental change especially in aquatic habitats that can experience rapid changes in water quality. For obligate aquatic amphibians, such as the salamander *Amphiuma tridactylum*, large changes in solute concentrations offer additional challenges, as they have limited options for escape and avoidance from their obligate habitat. As a portion of the range for *A. tridactylum* is periodically subject to large changes in salinity due to salt water intrusion (17 ppt salinity during a storm event) and drought (6.5 ppt), it is probable that populations of this species process a wide ranging salinity tolerance, specifically those populations within coastal regions and estuaries. We present the behavioral results of salinity preference for *A. tridactylum* and discuss future experiments use to determine the species-specific osmoregulatory capacity of this fully aquatic salamander.

351 **Freshwater Science**

Harvest and taxation strategies given uncertain mathematical models: Towards discerning the true nature of predator-prey natural resource systems

Dale B. McDonald, McCoy School of Engineering, Midwestern State University, TX

Deeper understanding of natural resource systems is increasingly important given human population expansion. The study of such systems is complicated; knowledge of fundamental behavior cannot be known exactly. Consider a predator-prey system where the predator is protected while the prey is subject to commercial harvest. The literature reflects that any human interaction typically involves decisions that affect sustainability, taxation, employment, and additional economic and environmental factors. Regulatory agencies implement taxation to generate revenue and regulate biomass levels. Commercial ventures seek to generate revenue and employment, influenced by taxation. From a field perspective exact quantification of biomass levels is not possible. However, these efforts are vitally important as information gathered from natural populations is the only means by which suitable mathematical models may be constructed that allow for generalization and prediction. The literature reveals some controversy as to how predation may be modeled; prey-dependent as opposed to ratio-dependent. Investigators have often used field and/or mathematical arguments to justify the particular model and derive harvesting/taxation strategies applicable within that framework. We feel the true nature of the ecological system may be determined through human interaction (harvesting) without assuming a particular mathematical form. Given such a commercial harvesting strategy, can we discern information as to the true nature of the ecological system? In effect, a known harvesting effort will be implemented as a means to better understand predator-prey population dynamics. Analytical and simulation results are included to provide clarity to the analysis and understanding of these complex systems.

364 **Freshwater Science**

The apple doesn't fall far from the tree: Reproductive characterization of the newly renamed apple snail, *Pomacea megastoma*

Allyson Plantz*, Cristhian Clavijo, Fabrizio Scarabino, Katie Gibson, Ana Elise Rohrdanz and Romi Burks, Southwestern University, Georgetown, TX

Exotic, invasive species pose considerable threats to freshwater systems worldwide. The family Ampullariidae, a group of amphibious snails, includes some of the most invasive freshwater mollusks globally. Fecundity of two species within the genus *Pomacea*: *P. canaliculata* and *P. maculata,* (formerly *P. insularum*) accounts for the extensive distribution of Ampullarids in the United States and Asia. Comprehensive taxonomic revision (specifically Hayes et al. 2012) recently contributed another species, *P. megastoma,* (formerly *Pomella megastoma*) to *Pomacea.* The small amount of published literature and noted invasive success of *P. canaliculata* and *P. maculata* spurred a reproductive assessment of ecologically similar *P. megastoma*. During December-January 2011, we conducted a comparative reproductive assessment of *P. megastoma* in its native region along the western boundary of Uruguay. We collected clutches from *P. megastoma*, *P. canaliculata* and *P. maculata* (43, 42 and 27 respectively), measured basic clutch characteristics (length, width, depth, and mass) and quantified fecundity using number and size of eggs. We combined this survey with past collections in Uruguay to form a more extensive native geographical distribution for this species. Our collections revealed that females of *P. megastoma* produced clutches with the greatest width, depth, mass and egg size compared to *P. canaliculata* and *P. maculata.* These findings demonstrate that reproductive potential of *P. megastoma* may reflect fecundity of related species. Given the unknown potential of this species to enter the aquarium or aquaculture trade, future research needs to quantify hatching efficiency and tolerance of *P. megastoma* to various abiotic factors.

372 **Freshwater Science**

My omnivore dilemma: Diet flexibility in two different apple snails, *Pomacea maculata* and *P. canaliculata*

Tracy V. Day* and Romi L. Burks, Southwestern University, Georgetown, TX

Studies that utilize N^{15} and C^{13} help elucidate trophic levels and energy flow within food webs. My research employs stable isotopes to quantify trophic position of two rising aquatic, exotic, invasive apple snail species: *Pomacea maculata* and *P. canaliculata*. Native to South America, apple snails establish sustainable, reproductive populations globally through voracious consumption of aquatic resources. Generally considered herbivorous, these snails may feed on other resources that reflect a more omnivorous nature. Currently, their exact trophic position remains unclear. To determine trophic position of an exotic population of *P. maculata* in Texas (Armand Bayou, suburban Houston) and an exotic population of *P. canaliculata* in Hawaii (Kawai Nui Marsh, Oahu), we collected food sources and multiple life history stages of apple snails including clutches. All samples went to UC Davis stable isotope laboratory for analysis. Texas field samples unexpectedly revealed higher macrophytes N^{15} values (*Colocasia esculenta* - 17.72, *Eichornia crassipes* - 15.4) than snail values (*P. maculata* ~10.7). Curiously, enrichment did not occur in periphyton (2.68) collected from a similar habitat. We attempted to address this discrepancy by collecting samples from a Hawaiian marsh (perceived as less nutrient enriched) and running controlled laboratory experiments to isolate isotopic signatures. With analysis pending, additional results from Hawaii, if congruent with our *P. maculata* results, may support our hypothesis that snails utilize other sources of organic matter than only aquatic plants and that nutrient enrichment may result from excessive nitrogen runoff. Documentation of omnivory would partially explain the invasive success of apple snails.

394 **Freshwater Science**

Recreational effort and economic impact of Guadalupe bass angling in Central Texas Streams.

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The Guadalupe bass, *Micropterus treculii*, is a Central Texas endemic black bass species occurring only in streams and rivers draining the Edwards Plateau. It is designated the state fish of Texas and provides a popular sport fishery. The angling experience is often compared to those shared by trout enthusiasts; i.e. size of fish caught is less important than the overall fishing experience. Past human dimensions research has focused more on reservoirs, while little is known about fishing effort, economic impact and preferences of stream anglers who target black bass species. A Web-based open-access survey of anglers was initiated in August 2012 to quantify recreational effort, assess attitudes, and the economic impact of anglers fishing in a 24 county area of Central Texas streams in the preceding 12 months, with a focus on anglers who specifically targeted Guadalupe bass. To date, 670 anglers have participated in the survey. Thirty-four percent of anglers ranked black bass as their most preferred sport fish species. Forty-three percent of anglers reported spending more than half their time fishing specifically for Guadalupe bass. An estimated $3.8 million in direct angler expenditures was spent on fishing trips to Central Texas streams by the anglers surveyed. On average, anglers took an average of 19 fishing trips per year lasting 2 days, and spent an average of $304 per trip. These findings indicate significant angler expenditures are made by anglers who fish Central Texas streams, some of whom prefer to fish for black bass and target Guadalupe bass.

395 **Freshwater Science**

A checklist to the common fishes of the Bull and Upatoi Creeks Watershed of Georgia

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We sampled fishes from eight creeks within the Bull and Upatoi Creeks Watershed in the summer of June 2001 and August 2002. These creeks demonstrate a west to east gradient of urbanization within Muscogee County, Georgia and provide an ideal opportunity to investigate the effects of urbanization. We collected a total of 2407 individuals representing 35 species from Lindsey, Cooper, Flatrock, Bull, Dozier, Randall, Kendall, and Baker Creeks by seining and electrofishing. This sample will provide data for a more comprehensive study investigating assemblage structure of and fluctuating asymmetry in fishes due to urban disturbances. Herein, I specifically report on species richness (R), total abundance (TA), the Shannon-Weiner diversity index (H'), maximum species diversity (H' max), and species evenness (J') for all eight creeks within the watershed and present preliminary data on the fluctuating asymmetry associated with urbanization.

412 **Freshwater Science**

Potential effects of global warming on stream ecosystem structure and function

Jacqueline Lee* and Chad Hargrave, Sam Houston State University, Huntsville, TX

Global temperature is expected to increase by 2 to 6C within the next 100 years. The broad-scale global effects of this increase in temperature are vast. For example, ice sheets will melt, sea level will rise, weather patterns will change, and organism distribution and abundance will shift. These global implications of a warming climate have been the focus of much research. However, the effects of warming at smaller local scales are less studied. This possibly results from the multitude of local ecosystem types warranting warming experimentation. In this study, we examined the effects of +2C warming on structure and function of a stream ecosystem. We used experimental stream mesocosms to examine the effects of elevated temperature on stream ecosystems. In this presentation, we report on elevated temperature effects on water column nutrients, benthic primary productivity and algae biomass, leaf litter decomposition and microbial productivity, benthic invertebrate density and biomass, and fish growth.

413 **Freshwater Science**

Conservation status of the endangered Comanche Springs Pupfish and Pecos Gambusia in the San Solomon Spring complex

Chad Hargrave*, Sam Houston State University, Huntsville, TX, Gary Garrett, David Riskind, Texas Parks and Wildlife Department, Austin, TX, Mark McKinstry, Bureau of Reclamation, Salt Lake City, UT

Intense human demand on groundwater in the desert southwest has reduced availability of spring habitats throughout this desert landscape. This habitat loss has increased the extinction probability of two species within the Pecos River watershed – Comanche Springs Pupfish (*Cyprinodon elegans*) and Pecos Gambusia (*Gambusia nobilis*) by limiting population size and distribution. In attempt to prevent global extinction of these species, Texas Parks and Wildlife, U.S. Fish and Wildlife and Bureau of Reclamation have restored wetland habitats in several areas that may provide essential ecosystem services necessary for the persistence of these two endangered fishes. In this presentation, we will report on 4 years of population estimates as well as population age structure for these fishes. Additionally, we will report on food habitats from gut content and stable isotope data. Population size, age structure and food habits will be correlated with

environmental monitoring data. From these correlates, we will address some potential principal habitats necessary for long-term population viability of these endangered fishes.

414 **Freshwater Science**

Fitness costs of larval trematodes in two closely related poeciliids with different reproductive strategies.

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The Red Queen Hypothesis predicts that genetic recombination via sexual reproduction allows organisms to maintain genetic diversity and, in theory, enable hosts to stay one step ahead of co-evolving parasites. In contrast, parthenogenetic organisms have no genetic recombination and should serve as targets for parasite specialization and suffer from heavier parasite loads than sexual species. Parthenogenesis should, therefore, be disadvantaged over evolutionary time if parasites significantly affect host fitness. Sexually reproducing sailfin molly, *Poecilia latipinna* were found to harbor significantly more parasites compared the parthenogenetic relative, *P. formosa*, in contrast to evolutionary theory. I investigated the fitness cost of infection on host reproduction in *P. latipinna* and *P. formosa*. Females were collected from irrigation canals in the Lower Rio Grande Valley, by seining, in Spring and Fall 2011, in order to compare the effects of parasite load on brood size when parasites are least abundant (spring) to most abundant (late summer). In the spring sample, brood size was positively related to body mass and negatively impacted by the number of trematode metacercariae lodged in gill tissue for both host species regardless of reproductive strategy. No effects of parasites were detected in the summer sample despite significantly higher number of parasites. In addition, sexually reproducing mollies harbored a significantly larger number of gill parasites in the spring sample when compared to the parthenogenetic relative.

429 **Freshwater Science**

Energy reserves in mayfly naiads and adults (*Hexagenia limbata*) from a north central Texas lake

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Mayflies (Order Ephemeroptera) spend most of their life feeding on algae as aquatic larvae (naiads) in the silt of lake bottoms or streams, but then they emerge as nonfeeding adults, a stage which lasts approximately 24 hours. For activities such as flights for mating and oviposition, adults must rely on stored energy, which are principally lipids and glycogen. This study focuses on the fatty acid composition of lipid stores and glycogen reserves from *Hexagenia limbata* (Serville) adults and late-instar naiads from Lake Arrowhead in North Central Texas. Lipids from whole-body homogenates were extracted with organic solvents, and fatty acids were analyzed by gas chromatography-mass spectrometry (GC-MS). Glycogen was extracted and quantified by spectophotometric analysis using standards of known quantity. Adult males exhibited the highest amount of lipid as a percentage of dry weight, followed by naiads and females. The most abundant fatty acids were 16:0>18:1>16:1 in both naiads and males and 18:1>16:0>16:1 in females. The predominant lipid class was free fatty acids in males and triglycerides in females. The glycogen trend was reversed, with female adult mayflies containing up to 20X the glycogen concentration as males. These profiles suggest that glycogen is used as readily available energy for female mayflies while lipids are stored in triglycerides for later oocyte production. Males quickly mobilize both lipids and glycogen to supply energy for flight.

P433 **Freshwater Science**

Parasite diversity of mosquitofish (*Gambusia* sp.) from the Red Arroyo

L. Austin Gilbert* and Nicholas J. Negovetich, Angelo State University, San Angelo, TX

Parasite species checklists of Texas suggest that some parasites are distributed ubiquitously throughout the state. Texas, however, is not homogenous in its geology or ecology. For example, east Texas is characterized by abundant rainfall and many streams and lakes that have made the region a focal point for studies in parasitology. In contrast, west Texas is arid with a paucity of aquatic systems. Parasitological surveys of hosts may have been performed in one pond or stream, yet the parasite record assumes distribution throughout west Texas. *Gambusia* sp. are distributed throughout Texas, including the streams and ponds of west Texas. These small fish play an integral role in many parasitic life cycles by serving as the transmission vessel that transfers the parasite to the final host. The focus of this study is to survey the parasites of *Gambusia* sp. from a pond in San Angelo, Texas, so that inferences can be drawn about the parasitic community in the area. A combination of *Gambusia affinis* and *Gambusia geiseri* were necropsied and their parasites recorded. Approximately 93% of the 40 mosquitofish examined in Fall 2012 were infected with parasitic worms. Prevalences were 80% for monogeneans, 48% for trematode metacercariae, 15% for larval cestodes, 13% for larval acanthocephalans, 5% for pentastomid nymphs, and 3% for nematode larvae. Further investigation of the parasite community of *Gambusia* sp. will provide a means of discerning the ecological processes occurring in this area.

P445 **Freshwater Science**

Storm mediated changes in nitrogen and phosphorus uptake length in a spring fed river

Aaron Swink*, Weston Nowlin and Benjamin Schwartz, Department of Biology, Texas State University, San Marcos, TX

Nutrient uptake length has been used for decades as a measure of ecosystem efficiency and limitation in lotic systems. Recent improvements in methodology (i.e., pulsed tracer addition experiments; Tank et al. 2008) have allowed nutrient uptake length measurements to be performed in larger rivers in which it was cost-prohibitive to perform more traditional uptake methods (i.e., short-term steady state injection). Using a pulse nutrient and conservative tracer addition method, NH_4^+ and PO_4^{3-} uptake length will be measured in the upper portion of the San Marcos River during base flow and after storm runoff events. The San Marcos River (central Texas, USA) is a high-discharge (5000 L/s) spring-fed river that is home to several endangered aquatic species. Water quality in the upper part of the river is high with concentrations of ammonium (NH_4^+) and phosphate (PO_4^{3-}) usually less than 30 µg/L during base flow conditions. However, during periods of intense rainfall, runoff from the surrounding watershed is N and P rich, thus nutrient-laden storm water may have substantial effects on ecosystem function. Additionally, to determine the effects of storm-flow nutrient pulses on biological production, dissolved oxygen (DO) will be monitored using a TROLL 9000 data logging sonde installed in the river for the duration of the study. Pre- and post-storm elemental composition and C:N:P ratios of periphyton algae will also be used to estimate uptake of nutrients.

450 **Freshwater Science**

Biogeography and ecosystem function of major aquatic bacterial groups in a Gulf Slope (TX) river system

Jesse C.Becker*, W.H. Nowlin, and D.Hahn, Department of Biology, Texas State University, San Marcos, TX

Bacteria are one of the most abundant and diverse forms of life on the planet, and they are essential to nearly every biogeochemical cycle. However, because of their small size, limited variation in morphology, and later gene flow mechanisms that hinder species identification, we know little about the biogeography of even major groups of bacteria and the relationship between bacterial ecosystem function and community composition. We sampled pelagic microbiota from 20 locations in the lower Brazos River watershed and analyzed the major divisions of the microbial community through fluorescent in situ hybridization (FISH). The taxa examined were Domain Bacteria, Domain Archea, Domain Eukarya, α-, β-, γ-, and δ-proteobacteria, a portion of Cytophaga-Flavobacterium, as well as high GC Gram-positive and low GC Gram-positive bacteria. Microbial abundance was significantly different for all groups between all watersheds, while proportional abundances of groups in the communities were only significantly different in a few cases. Total abundances ranged from 1.2 x 106 -2.6 x 107cells/mL. Microbial communities were composed largely of β-proteobacteria and high GC Gram-positive cells (19±9% and 5±2% of the total detectable cells, respectively), while Archea were the least abundant group (1±0.8%). Measures of bacterial ecosystem function were weakly correlated to both total and proportion abundance different microbial groups,with γ-proteobacteria being correlated to bacterial production in statistical modeling efforts. Bacterial respiration was correlated with the total abundance of Domain Bacteria, while bacterial growth efficiency was correlated with both total and proportional abundance of γ-proteobacteria and high GC Gram-positive cells.

454 **Freshwater Science**

Double trouble for local salamanders: substrate and food availability for two populations of the endangered Georgetown salamander, *Eurycea naufragia*

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Particularly sensitive to urbanization, freshwater ecosystems often support organisms that exhibit little tolerance for changes to their habitats. Land use managers must carefully consider effects of development on sensitive watersheds. The Georgetown salamander, *Eurycea naufragia*, only occurs in Williamson County, TX and recently qualified for consideration as a federally endangered species. Our study investigated freshwater springs (Twin Springs and Swinbank Spring) housing the largest known populations of *E. naufragia*. Over a one year period, we took monthly samples of the abundance and taxa richness of macroinvertebrates and meiofauna from multiple microhabitats (water surface, hard substrate and sediment) within each spring. In addition to quantifying macroinvertebrates, we characterized each spring in terms of the amount and type of substrate (gravel, cobble, boulders, silt, sand and woody debris) found throughout the reach. Overall, we found no significant differences between the two springs in abundance or taxa richness of macroinvertebrates although seasonal trends occurred. Both springs displayed greater abundance during warmer months. While amphipods, chironomids, caddisflies, and damselflies persisted at both sites, mayflies only occurred at Twin Springs. Cobble comprised over 30% of the substrate present at both springs with the remainder being large rocks, sticks & twigs of various sizes and leaf litter sometimes covering the larger substrate. Twin Springs contained greater amounts of silt than Swinbank Spring, as evidenced by deeper pools. Our work provides critical baseline data for springs holding a critically endangered species and suggests the need for continued monitoring as silt accumulation negatively impacts aquatic life.

P481 **Freshwater Science**

Seasonal variation in reproduction of the largespring Gambusia, *Gambusia geiseri*, in two spring systems in Texas

Tamara Fraker* and Raelynn Deaton, St. Edwards University, Austin, TX

The largespring Gambusia, *Gambusia geiseri*, is a stenohaline livebearing fish with a limited distribution in central and west Texas. *Gambusia geiseri* was introduced throughout Texas in the 1930s 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 where it may be out-competing the endemic and endangered *Gambusia nobilis*. Largespring Gambusia is thought to be native to the headwaters of the San Marcos and Comal Rivers. Previous data by Sanchez et al. (unpublished) show that this species varies in winter 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 is to compare year-round reproductive investment of the largespring Gambusia in both the San Marcos and Comal River populations. Each month since January 2012, males and females were collected from the upper San Marcos and Comal Rivers. 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.

P516 **Freshwater Science**

Using personality traits to identify potential for invasivness in two livebearing fishes (*Gambusia affinis* and *Gambusia geiseri*)

Jack Sawin* and Raelynn Deaton, St. Edward's University, Austin, TX, Craig Sargent, University of Kentucky, Lexington, KY, Robert Hopkins, University of Rio Grande, OH

Gambusia exhibits considerable interspecific variation in geographic range size, and degree of range expansion. One of the most cosmopolitan stream species, *G. affinis*, has been introduced outside its native ranges for mosquito control, both in North America and on other continents, and is considered highly invasive. *Gambusia geiseri*, a spring dwelling species introduced throughout Texas, is now considered a possible invasive threat to other native *Gambusia*. We propose that understanding natural expansion of native ranges will give insights into invasiveness where these species have been introduced. *Gambusia* has been well studied from both the condition-dependent and personality frameworks. Considerable work has been done on dispersal from the point of personality. Sih and colleagues analyzed dispersal in *G. affinis* and found that the most asocial bold individuals dispersed furthest and individual dispersal was affected by mean boldness and sociability of the population, regardless of individual personality. Rehage & Sih (2004) found higher

dispersal tendency in *G. affinis* than in the non-invasive spring-dwelling congener *G. geiseri.* Here we test personality "syndromes" comparatively for both congeners, including boldness (mating in both novel environment and presence of predators), exploration (movement in a novel environment), and sociability (tendency to shoal) following modified methods from Cote et al. (2009). We will present data from three experiments testing the hypothesis the *G. affinis* will exhibit behaviors that are more likely to promote invasiveness (e.g. boldness) than *G. geiseri.* These data will be used along with life history to model potential for range expansion.

P542 **Freshwater Science**

Investigating potential factors that may influence gregarine parasitism variability among populations of the damselfly, *Argia moesta*, in central Texas

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Odonates (dragonflies and damselflies) are well known to host gregarine (Apicomplexa) parasites. Gregarine prevalence and intensity vary significantly among and within odonate host populations but little is known about the factors governing this variability. Damselflies of the genus *Argia* are an ideal target for a large-scale survey of gregarines because they commonly host gregarines and are widely distributed. In *Argia*, gregarine transmission occurs horizontally when individuals ingest infective oocysts in the environment. Here, we investigate the variability of infection across space and time and assess the association between parasitism variability with two host population parameters. Because we hypothesized an association between parasite infection level and water flow dynamics and/or host population density, we sampled *A. moesta* populations biweekly from six sites in central Texas with varying degrees of water flow and host density. Samples were dissected under a dissecting microscope for gregarines trophozoites/gamonts. Parasite prevalence and intensity did not differ between males and females or through time, therefore they were combined for this preliminary analysis. Prevalence and intensity ranged from 20% to 95% and 3 to 15 parasites per host, respectively. Prevalence and intensity differed among sites, but our preliminary data indicate no relationship between gregarine prevalence/intensity and flow dynamics of the system or host density.

P582 **Freshwater Science**

Aquatic invertebrate community composition and similarity among playas with different land use

Jacob Kemmer*, Kady Pryde, Jarrett Ross, Trevor Burrow, Victoria Chavez, Edward Taragon, and Andrew C. Kasner, Wayland Baptist University, Plainview, TX

The objective of this study was to determine patterns of aquatic invertebrate richness and abundance of 5 playas surrounded by different land uses in Hale and Swisher counties in the Southern High Plains of Texas. Invertebrates were collected from late June-early July 2012 in playas with different landscape uses: one urban playa; one in Wetland Reserve Program (WRP) surrounded by unplowed, grazed grassland; one permanent playa filled with groundwater and surrounded by grazed pasture; one surrounded by grazed, expired Conservation Reserve Program (CRP) grassland; and one surrounded by wheat and a narrow natural buffer. Water chemistry (hardness, pH, dissolved oxygen, salinity, turbidity, and temperature) was measured at each site to determine chemical differences among playas, with no differences found among playas relative to land use. The urban and expired CRP playas had the lowest aquatic invertebrate species richness (n=7 species in each) compared to the permanent playa (n=16 species), WRP playa (n=16 species), and wheat playa (n=15 species). Jaccard's Community Similarity Coefficient (CC_J) showed the greatest similarity between the WRP playa and wheat playa (CC_J=0.41), while the least similarity occurred between the permanent playa and expired CRP playa (CC_J=0.10). The permanent playa community was dissimilar to all other playas (CC_J<0.20 for all comparisons) followed closely by the urban playa (CC_J<0.28). There was also a significant difference in the average number of brachiopods per dip net sample among playas (H=17.73, df=4, P=0.001), with brachiopods most abundnant in the WRP playa and absent from the urban playa and permanent playa. The results suggest that land use surrounding playas may be an important determinant of playa invertebrate community composition.

603 **Freshwater Science**

Monogamous biparental care in the invasive Rio Grande Cichlid: How the brain shapes behavior

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Monogamous pair bonding is well known in certain fishes and biparental brood care may help some species establish invasive populations in the southern US. The monogamous Rio Grande Cichlid,*Herichthys cyanoguttatus*, has established populations in Texas, Florida, and Louisiana. The Cuatro Ciénegas Cichlid, *H. minckleyi*, is polygamous, providing an excellent comparison for studying monogamy. We found that *H. cyanoguttatus* males mate and cooperatively defend a small territory with one female. However, in *H. minckleyi*, a small number of large males defend large territories in which they mate with multiple females. Comparisons of indirect parental care behavior in the form of nest defense found that male *H. cyanoguttatus* performed more aggression against brood predators than did male *H. minckleyi*, possibly increasing their potential for successful invasion of new localities. Additionally, the neuropeptides arginine vasotocin/vasopressin (AVT/AVP) mediate aggression, space use, and pair bonding in male vertebrates. Levels of mRNA for the AVT/AVP receptor V1a2 were higher in the hypothalamus of H. minckleyi. Androgenic steroids have also been associated with aggression and territoriality. *Herichthys minckleyi* had higher plasma levels of the androgen 11-ketotestosterone, while testosterone levels were higher in *H. cyanoguttatus.* Our results indicate that a highly active AVT/V1a2 circuit(s) in the brain is associated with space use. Thus pair bonding is mediated either by a different and less active AVT/V1a2 circuit or by another neuroendocrine system, such as isotocin.

317 **Geosciences**

Depositional interpretation using integrated sedimentological and paleontological data from a fossil-bearing unit within the Blackwater Draw Formation, Plainview, Texas

Taryn Shadden*, David Schmidt, Wayland Baptist University, Plainview, TX and Brian Steffen, South Louisiana Community College, New Iberia, LA

A fossil-bearing unit within the Blackwater Draw Formation, previously interpreted as entirely fluvial deposition, is exposed in an abandoned quarry wall inside the city limits of Plainview, Texas. This unit was laterally sampled to investigate the nature of deposition based on composition, grain size analysis, and taxonomic variation of fossil molluscs. Compositionally, grains are predominantly quartz with minor amounts of feldspars and carbonates. All sampled sites (PS 1, 2, and 3) exhibit similar grain size histograms (of variable grain size distributions), and contain bimodal negatively skewed frequency curves that indicate low stream flow velocity. Of these sampled sites, PS 3 exhibited the greatest variability. For example, samples PS 3B1 and 3B2 appear texturally different than others, showing a negatively skewed unimodal frequency curve which is typical of eolian sedimentation. Samples 3A1 and 3A2 contain a higher concentration of carbonate grains, carbonate-coated quartz grains, and *Gyraulus parvus*. Such characteristics are uniquely different from the other samples and are more representative of conditions and sedimentation in shallow, non-flowing bodies of water. Taxa of fossil molluscs are distributed laterally but with variable proportions. Location 3 is represented by strictly aquatic varieties, while locations 1 and 2 are represented by mostly aquatic taxa with variable semi-aquatic and terrestrial forms. Therefore, current data from the fossil-bearing unit suggest disparity in depositional environments, indicating that sedimentation and taxonomic diversity is not completely controlled by fluvial processes.

332 **Geosciences**

Geological mapping of late Cretaceous to late Eocene strata within the Indian Creek area, Buffalo Gap National Grasslands, South Dakota

Garrett Williamson*, David Schmidt, and Tim Walsh, Wayland Baptist University

During the summer field season of 2012, it was recognized that a detailed geologic map of the Indian Creek area within the Buffalo Gap National Grasslands of South Dakota could be established. According to current knowledge, no detailed geologic map of the permitted field area has been published. Therefore, a preliminary map that includes members (Ahearn, Crazy Johnson, and Peanut Peak) of the Chadron Formation as well as the Chamberlain Pass and Pierre Shale Formations has been constructed. Each member and formation were located, measured, lithologically described, and compared to previous interpretations. Other collected data consisted of coordinates and elevations between stratigraphic boundaries. This information was acquired using a Trimble Geo XH with Terrasync 5.30 software. Once field data was transferred into ArcGIS 10.0, a map scale of 1:8000 was selected to show detail covering an area of 1.4 km ^{2}. The data was overlaid with Digital Raster Graphs (DRG) and Digital Orthophoto Quarter Quadrangles (DOQQ). Contact lines of stratigraphic boundaries were digitized through coordinate points and correlated with surface topography to create a current geologic map. A detailed map of discernible stratigraphic units within the Indian Creek area will be a valuable tool for future paleontological and geological investigations. Since, more information is needed to cover the entire designated field area of 9 km ^{2}, field work will continue in the summer of 2013 to obtain the necessary data for completion of this project.

P334 **Geosciences**

Delineation of speleogenetic development in the Owl Mountain province: Fort Hood Military Installation, Texas

Melinda Shaw Faulkner*, Kevin W. Stafford, Aaron W. Bryant, Stephen F. Austin State University

The Fort Hood Military Installation is a karst landscape characterized by Cretaceous-age limestone plateaus and canyons in Bell and Coryell Counties, Texas. The area is located in the Lampasas Cut Plain region of the Edwards Plateau and is stratigraphically defined by exposures of the Fredericksburg Group. Dense vegetation and military land use preclude extensive traditional karst survey inventories. Airborne Light Detection and Ranging (LiDAR) provides an alternative for high-density and high-accuracy three-dimensional terrain point data collection. The availability of high density data makes it possible to represent terrain in great detail; however, high density data significantly increases data volume, which can impose challenges with respect to data storage, processing, and manipulation. Spatial interpolation of 105 km ^{2} of the Fort Hood Military Installation provided depression data for 9,175 sinks. These data were filtered and classified using geoanalytical methods to remove major natural and anthropogenic terrain modifications, resulting in the delineation of 1,538 karst sinkholes. The remaining sinks were used to create a karst depression density map to determine spatial relationships of speleogenetic development. The increasing capabilities of GIS (Geographic Information Systems) and accuracy of geographically referenced data has provided the basis for more detailed terrain analysis and modeling. Although LiDAR analysis can be a powerful tool, filter mechanisms must be employed to remove major natural and anthropogenic terrain modifications in order to more accurately analyze data.

P386 **Geosciences**

Geochemical analysis of aquifers in the Concho River watershed, TX

Garrett Harris, James W. Ward, PhD, Angelo State University

The primary goal of this research is to compile and model chemical compositions of various aquifers to the Concho River Watershed of West-Central Texas for comparative purposes with recently sampled waters to aid in waters source determination. The chemical analysis of ions from various wells (Texas Water Development Board data) in the Concho River Watershed covering 14 Texas counties, as well as physicochemical data, has been compiled as attribute tables in ArcGIS 10. Maps of 35 major to minor aquifers within the watershed have been created using ArcGIS 10 and well water chemical analysis maps of each aquifer. These maps display regional and local groundwater flow patterns of the area along with chemical signatures of these various aquifers. Piper diagrams will be used to show the percent composition of major ions for each individual aquifer within the Concho River Watershed. This database and GIS-based maps will be used as a reference of comparison for future obtained water samples to aid in the determination of origins of regional waters.

P410 **Geosciences**

A taxonomic and taphonomic description of an ungulate fossil from the Chadron Formation of the Buffalo Gap National Grasslands, South Dakota

Hunter Green*, and David Schmidt, Wayland Baptist University

In a recent field expedition to the Indian Creek area within the Buffalo Gap National Grassland, South Dakota, a field team from Wayland Baptist University collected fossil specimens from the White River Group. This area is recognized as one of the most fossiliferous localities spanning late Cretaceous to early Miocene strata. A partial mandible of a large fossil ungulate was recovered from the upper Chadron Formation and is being investigated for its taxonomic relationship and condition of preservation. A preliminary description and morphometric analysis has been conducted on recovered skeletal elements. The left dentary is highly fractured and measures 30.7 cm in length and 9.2 cm diagonally from the angular process to the curved antero-dorsal margin of the ramus, approximately 3 cm behind molar 2. Additionally, the left dentary contains an incomplete tooth row that measures 13.7 cm in length consisting of molars and premolars. The right dentary is represented by several fragments with incomplete dentition. Based on dental and skeletal morphological comparisons to other large ungulates from the Chadron formation, Brontotheriidae, Hyracodontidae, and Camelidae families are currently considered for taxonomic assignment. Although Camelidae is not a typical representative of the Chadron Formation, the more stream-lined morphology of the dentary and lack of robust bone implies features more characteristic of ruminants. Most of the observed fractures in the left dentary appear to have occurred after fossilization. However, bone weathering and fracturing prior to fossilization is indicated by fracture-filling clay and flakes of bone within the matrix.

464 **Geosciences**

Polydeformation indicators in the Packsaddle Schist Near Mason, TX

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A long roadcut near Comanche Creek on U.S. Hwy 87, south of Mason, Texas, exposes Proterozoic Packsaddle schist with evidence of multiple deformational events. A main foliation, here referred to as S1, is prominent throughout the schist; later deformation folded it into synforms and antiforms. Some of the similar to parallel folds have chevron hinges, cuspate morphology or box folding, with interlimb angles from isoclinal to open. A distinctive second foliation, S2, has formed perpendicular to S1 in much of the outcrop. In places, the later foliation has been caused by a strong crenulation of the earlier foliation. Rotated, winged, elongated porphyroblasts, pseudostratigraphy and intrafolial folds indicate a ductile mylonitic fabric. Multiple generations of cross-cutting felsic dikes and sills intrude into or divide the biotite and amphibole rich schist zones. This outcrop reveals the complex Precambrian history of the Llano Uplift and is particularly instructive for students in petrology and structural geology classes.

473 **Geosciences**

Stromatolitic Bioherms in the Upper Cambrian, Point Peak Member of the Wilberns Formation near White's Crossing, south of Mason, Texas

R. LaRell Nielson* and Chris Barker, Stephen F. Austin State University

Large stromatolitic bioherms have been exposed, in the Point Peak Member of the Wilberns Formation by the down-cutting of the Llano River at White's Crossing south of Mason, Texas. The river has cut through the stromatolitic buildups, exposing the interior of large bioherms and associated laminations. Typically, one side of the buildups shows a slightly steep contact, whereas the other side is more curved. This relationship suggests that the stromatolites may have acted as wave resistant structures. On the north side of the Llano River, along Honey Creek, smaller stromatolitic bioherms are also exposed. These stromatolites are found in beds of up to 1 m thick and in patches up to 10 m in diameter. The patches consist of a number of hemispheroidal laminated heads up to 75 cm in diameter. Each hemispheroidal head contains dome shaped laminations. The area between the heads has been filled with mudstone. Between the patches of hemispherical bioherms there are laminated beds of fossiliferous mudstone. The presence of stromatolitic bioherms surrounded by laminated mudstone at White's Crossing on Llano River, suggest that a low-energy lagoon, environment, that lacked extensive bioturbation, was present during the Cambrian Period.

P477 **Geosciences**

New geologic mapping in the southern Marathon Uplift

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The little-studied southern Marathon uplift exposes Paleozoic and lower Cretaceous sedimentary rocks, the hanging-wall of the Hells Half Acre thrust (HHAT), the highest Paleozoic thrust sheet, and polyphase late Paleozoic Marathon-Ouachita structures overprinted by Laramide, and possibly Basin and Range, faults and folds. Existing geologic maps covering the parts of the area include King (1937; 1:125,000), King (1980; 1:62,500), Graves (1954; 1:62,500), DeMis (1983; 1:24,000), Conners, (1977; 1:10,000), and Satterfield and others (2009; 1:12,000). Exposed section consists of Paleozoic Caballos Novaculite and Tesnus Formation unconformably overlain by Cretaceous Glen Rose Limestone, Maxon Sandstone, Del Carmen Limestone, Sue Peaks Fm, and Santa Elena Limestone. Cross-sections constructed from previous mapping show steeply dipping reverse faults related to the HHAT crosscutting northeast-trending Ouachita-Marathon folds. Two generations of northwest-trending Laramide folds, including overturned folds, deform Cretaceous and Paleozoic strata. Initial thin-section petrography on Devonian – Pennsylvanian Tesnus Formation show sandstones are sublitharenites of recycled orogen provenance similar to sandstones described in McBride (1989). Future work includes: 1:12,000 mapping, point counting sandstones from mapping area, describing Paleozoic and Cretaceous units in detail, finding fault-kinematic indicators, and measuring axial plane and fold axis orientations of map-scale and outcrop-scale folds. New mapping is testing hypotheses that: a) the HHAT is a domain-bounding, large-displacement fault (Muehlberger and Tauvers, 1989), b) Ouachita-Marathon structures were reactivated during Laramide transpression and Basin and Range transtension, c) Basin and Range faulting extends NE of the Black Gap graben, and d) the Marathon uplift is part of a NW-trending Laramide basement uplift.

506 **Geosciences**

Does Excel affect learning?: An assessment of spreadsheet-based modules in a Physical Geology Course

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Spreadsheets have been used for teaching math concepts for years. However, when students at USF began using spreadsheet-based modules to learn math and geology concepts they found them difficult to use. The problem most often mentioned was that learning how to use Excel took precedence over learning the concepts presented in the modules. We began to wonder if the Excel was getting in the way. To investigate this question, we placed students in Physical Geology courses into two groups: one group was given a set of modules and told to use Excel for all calculations; the other group was told only to complete the calculations but was not told what method to use. We expected students in the Non-Excel group would be less frustrated and thus attain a deeper learning of the concepts presented in the modules. However, the results of our study show that students in the study had high gains for both the math and geology concepts from the modules whether Excel was used or not. The only difference in gains we observed was that students in the course led by the author of the modules had larger gains in knowledge versus those in the course led by another instructor. We believe that spreadsheet-based modules are a good tool for teaching math and geology concepts and that the largest effect on the success of these modules lies in the teaching style and/or proximity to the author of the modules.

540 **Geosciences**

Well exposed Tertiary sills inflate Cretaceous Boquillas formation: SE Brewster County, Big Bend National Park, Texas.

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SE Brewster County in the Big Bend region contains passively or forcefully emplaced sills flanking Dagger Mountain (DM). Mapping at 1:10,000 scale, thin section petrography, and published data show differences in texture and composition appear to control emplacement mechanism. DM intrusions are part of the Trans - Pecos Igenous Province, a belt of subduction - related Cenozoic igneous rocks that stretches across Mexico and West Texas (Ewing, 1991). Regional Structural features around DM include Laramide folding and Basin and Range normal faulting. DM sills examined do not contain flow structures and do not strongly deform their well exposed country rock implying passive emplacement. DM sills also contain boudins and change in thickness of Boquillas formation implys possible forcefull emplacement by inflation. Similar change in thickness of Boquillas formation by sills is found in other areas of the Big Bend region (Cooper, 2011). Folds within and around DM sills imply sills were folded by Laramide D2 and Basin and Range D3 folds or intrusion occured after folding. DM sills are dated 32 Ma (40Ar/39Ar on monzonite; Morgan and Shanks III, 2008). and intruded slightly younger Cretaceous Boquillas formation limestone and calcareous shale. DM quartz diorite, anorthosite, gabbro, leuciteolite, nephelinite, and leucite gabbro contain major minerals hornblende, leucite, plagioclase feldspar, and nepheline, and minor minerals orthopyroxene, clinopyroxene, biotite mica, potassium feldspar, untwinned feldspar, and quartz. Mafic minerals comprise 30 - 80 percent of DM samples.

551 **Geosciences**

Pitfalls and challenges of dating deformations: Changing timing interpretations in the Sand Springs Range, western Nevada

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Constraining the timing of a regional deformation event by establishing the timing of folding and faulting relative to a dated intrusion can be challenging even in areas of excellent exposure such as the Sand Springs Range in the Great Basin of western Nevada. The Sand Springs Range exposes Mesozoic metamorphic tectonites on the north and south flanks of a dated Late Cretaceous granitoid pluton. Tertiary extrusive and intrusive igneous rocks overlap and flank Mesozoic rocks. Mesozoic tectonites contain ductile, syn-metamorphic first-phase (D1) folds and faults which are thrust-faulted and folded in two non-metamorphic phases of folding and faulting (D2, D3). First, Banaszak (1969) interpreted D1 deformation and metamorphism to be caused by forceful emplacement of Cretaceous plutons, making deformations Late Cretaceous and younger. Second, Satterfield and Oldow (1993) described evidence for Cretaceous plutons cross-cutting Mesozoic deformations. We also interpreted mid-Jurassic(?) lava flows above D1 tectonites to be folded in D2 folds and cross-cut by Cretaceous granitoids, implying that D1 deformation is no younger than Jurassic and that D2-D3 is Jurassic-Cretaceous. We interpreted Cretaceous Ar/Ar dates we obtained from metamorphic tectonites to date granitoid emplacement, not deformation. Our 2011 field work revealed that supposed mid-Jurassic(?) basalt is interstratified with Tertiary ash-flow tuff and cross-cuts a D2 thrust fault. New and previous mapping now constrain D1 – D3 deformation to be mid-Jurassic – early Cretaceous. Sand Springs Range work emphasizes that a critical eye that seeks out and recognizes compelling field relations must accompany detailed mapping and isotopic dating.

P555 **Geosciences**

Using multpile logistic regression and artificial neural network models to predict elevated bacteria concentrations in natural waters

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The primary goal of this research was to use physiochemical parameters and/or other microbial parameters to predict “safe for contact” or “unsafe for contact” fecal coliform (FC) and/or Escherichia coli (*E. coli*) concentrations within two different natural water systems. The first is a karst aquifer in the central Bluegrass Region of Kentucky and the second is the Concho River system in San Angelo, Texas. Multiple logistic regression (MLR) models in comparison with artificial neural network (ANN) models will provide insight as to which type of model will make a better tool for long-term evaluation of overall water quality within these systems without having to obtain microbial samples from the sites regularly. Physiochemical parameters measured included pH, electrical conductivity, water temperature and precipitation, while microbial parameters included FC and *E. coli.* Level of concern were determined by primary contact standards for both *E. coli* and FC, which was set as the binary dependent variable in the models (e.g., for FC values “unsafe for contact” were set to 1 [i.e., > 200] and values “safe for contact” were set as 0 [i.e., <200]) with the remainder of parameters considered as independent variables. A MLR model using only physiochemical parameters correctly predicted “safe for contact” conditions 65.6 % of the time and “unsafe for contact” conditions 69.2 % of the time. ANN models are showing promise and are currently ongoing, yet results are expected to be similar or slightly better in predictability to the MLR models.

570 **Geosciences**

What we have learned: Field experiences in West Texas

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We have conducted a multitude of Geology field trips and field camps in the Department of Physics and Geosciences at Angelo State University (ASU) in the past several years. Over time we have noticed changes in the type of student we have entering our program and attending geology related trips. With regard to this we have began to train our students better prior to attending a field trip or field camp by implementing a variety or requirements to minimize health and natural hazards to students on these trips. It is imperative as faculty that we decrease the overall liability of running these university sponsored events if they are to continue; therefore we have developed several innovative training ideas that we would like to share. The Geosciences is now educating students on health hazards associated with conducting field work in harsh environments such as how to identify symptoms of heat exhaustion, heat stroke and/or hypothermia, back country first aid, and implemented a Field Methods class prior to field camp where students are well trained on hazards associated with the outdoors. We have also recently obtained some extra insurance for students attending our geology trips for emergency coverage to aid in the payment of treatment for injuries if they occur and we now have satellite phones on us at all times if needed to contact emergency help. These are just a few things we are doing in the Geosciences program at ASU to make our program stronger and assure we are able to continue offering trips to our students.

P329 **Marine Science**

The effects of pH and algal coverage on Coral Reef health in Roatan, Honduras

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It has been suggested that the decline in coral populations could be caused by several different factors such as the rise in temperature of the ocean, algae growth, ocean acidification, and various human activities (Wangpraseurt et al 2012). This study was conducted to determine if algae growth on corals is correlated with coral disease. Algal overgrowth along with lower pH levels in the reefs near Roatan, Honduras would cause corals to stress, which would increase the rate of coral disease coverage. This experiment took place in the Caribbean Sea in Roatan, Honduras from 16 May 2012 through 18 May 2012. Belt transects of 10M by 2M were placed at varying depths to determine the amount of coral disease coverage and quadrats of 1M by 1M were placed at varying depths to determine the amount of algae coverage at each study site. The Hydro-lab measured the Temperature, Specific Conductance (SpC), Salinity, pH, Turbidity, and LDO at each study site. There was no significant correlation between pH or dissolved oxygen and coral disease coverage. There was a negative correlation between salinity and SpC and coral disease as well as a negative correlation between algae coverage and disease coverage. A long term study of Hydro-lab measurements at many dive locations around Roatan in various weather conditions would be beneficial to see if this correlation continues. A study to determine if algae are a physical barrier against coral disease would also be beneficial to determine if there is a symbiotic relationship between coral and algae.

369 **Marine Science**

Marine Plants of the Gulf Coast, a new book and information on the Laguna Madre Field Station

Roy L. Lehman, Texas A&M University-Corpus Christi, Department of Life Science

A new book entitled *Marine Plant of the Gulf Coast* will be available in late spring 2013. Published by Texas A&M University Press, the book is a field guide to the seaweeds, seagrasses, common shoreline plants and mangroves of the Gulf of Mexico. An overview of the book will be presented. The Laguna Madre Field Station (LMFS) is an educational and outreach facility of the College of Science and Engineering at Texas A&M University-Corpus Christi. The LMFS provides a site and facilities for field training, education and research in coastal environmental and ecological studies. The complex consists of three main buildings located on a dredge reclamation island in the Upper Laguna Madre near Corpus Christi, Texas. Spaces within the facility include: 1) a meeting room area that can be used as a classroom or dining area, 2) a laboratory suitable for both research and teaching, 3) two dormitory areas that can accommodate 20 people, and 4) a kitchen/food preparation area. Various coastal and marine ecosystems (including wetlands, salt marshes and seagrass beds) are easily accessible from the LMFS and facilitate research and educational activities for students, faculty and visitors. A description of the facilities, its mission and vision will be presented. The procedures for scheduling and availability will be discussed.

378 **Marine Science**

Behavioral characteristics in the sea slug, *Elysia crispata* in relation to light intensity

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Elysia crispata, sacoglasson molluscs, are unique organisms that are able to photosynthesize by incorporating algal chloroplasts from its algal diet into its epidermal cells, a process known as kleptoplasty. In order to investigate if the animal modifies its behavior to favor conditions for the chloroplasts, body orientation and movement were observed under three different light intensities. Body orientation was scored based upon the amount of tissue exposed to light regulated by the opening and closing of sea slug parapodia. Light conditions were designed to mimic the diurnal cycle with three intensities: daylight (11,981 lux), dawn/dusk (11,213 lux), and moonlight (3,983 lux). *E. crispata* ($n = 19$) behavior was recorded under each light condition for one hour, and body position and movement between quadrats were scored. For each animal, light treatments were sequential and the order randomized to prevent bias. A significant difference (ANOVA and Fisher's Least Significant Difference, $p < 0.05$) in parapodia orientation was observed between dawn/dusk treatment and both daylight and moonlight treatments. No difference was observed between daylight and moonlight treatments. Interestingly, the parapodia were more open in both the daylight and moonlight treatments. This suggests light affected parapodia presentation. *E. crispata horizontal and vertical* movement between quadrats was significantly different (Mood's Median, $p = 0.00017$) for both daylight and dawn/dusk light treatments. *E. crispata* moved away from the light in the daylight treatment, and moved toward the light during the dawn/dusk treatment. We are currently investigating other factors that may play a role in animal behavior.

390 **Marine Science**

The spatial and temporal distribution of the seagrasses and drifting macroalgae of Emmord's Seagrass Meadow in the Laguna Madre.

Veronica Thompson & Roy L. Lehman; Texas A&M University Corpus Christi

In order to assess the spatial and temporal distribution of seagrasses and drifting macroalgae within Emmord's Seagrass Meadow, six sites were chosen based upon the bathymetry of the meadow. Sites are arranged between, and parallel to, the King Ranch Shoreline (mainland), on the eastern section of the meadow, and to the Gulf Intracoastal Waterway (GIWW) on the western section. Depths vary between the sites with the southernmost sites averaging 136 cm, the middle 105 cm and the northern 119 cm. The principal natural current runs along the King Ranch Shoreline with another, lesser, current present in the man-made ICW. Prevailing wind direction is from the southeast in the summer and from the north-northwest in the winter. Emmord's Seagrass Meadow is dominated by three species of seagrass: *Halodule beaudetii, Cymodocea filiformis,* and *Halophila engelmanii.* Algal species that are dominant in this region include three members of the Rhodophyta: *Palisada poiteaui, Chondria littoralis*, and *Digenea simplex.*Objectives of this study were to determine the distribution of seagrasses based on temperature and depth as well as to determine the effect of wind direction, and currents, on the location of drifting macro algae in Emmord's Seagrass Meadow.

439 **Marine Science**

Lafitte's Cove case study: Complications arising from USACE Wetland permitting

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The controversy surrounding the Lafitte's Cove Nature Society (LCNS) began in the 1970s when Mitchell Development Corporation, owned by George Mitchell, acquired and sought to develop land on the West End of Galveston for the Pirate's Beach subdivision number 6, also known as Laffite's Cove. This land contained wetlands and an oak mott, a valuable site for migratory birds and one of only a few remaining on the Gulf Coast, as well as historical significance—aboriginals had used the site as a camp and burial ground until the late 1800s. Mitchell Development applied for a U.S. Army Corps of Engineers (USACE) permit in 1974 to dredge canals that would lead to Galveston West Bay; the permit contained provisions to mitigate the ecological damage of the proposed development, including deed restrictions and the creation of the Lafitte's Cove Nature Preserve under the jurisdiction of a Nature Society. The current point of contention lies primarily between the homeowners in Laffite's Cove and the LCNS regarding the limits of authority in the upkeep of these deed restrictions stemming from the final USACE permit.

P487 **Marine Science**

Seagrass epiphyte biomass patterns in the Lower Laguna Madre.

Edwin Quintero*, Joseph Kowalski and Hudson DeYoe

Seagrasses develop an epiphytic community on their leaves that can interfere with seagrass photosynthesis and nutrient uptake. Development of this community is a function of light, nutrient, currents and grazer community. In conjunction with a seagrass survey on the Lower Laguna Madre (LLM) in 2012, seagrasses leaves were collected for gravimetric epiphyte biomass analysis from a subset of 160 sites. The most widespread seagrass, *Halodule wrightii* had an average epiphyte load of 0.187 mg per sq cm (SD=0.583)(range 0 to 3.48 mg per sq cm). Highest epiphyte values were nearest the Arroyo Colorado which has a high nutrient load. *Thalassia testudinum* which was only present at 10 sites in the southern part of the LLM had an average epiphyte load of 0.166 mg per sq cm (SD=0.064)(range from 0.110 to 0.320). Highest epiphyte load for *Thalassia* was near a sewage treatment plant outfall.

P489 **Marine Science**

Sediment grain size patterns in the Lower Laguna Madre

John Garcia*, Esteban Triplett, Mark Besonen, Joseph Kowalski and Hudson DeYoe

Sediment characteristics in part determine the structure of benthic animal and plant communities. Sediment grain size is considered to be a major determinant of benthic animal distribution. The last systematic grain size survey of the Lower Laguna Madre was in 1980s. In conjunction with a seagrass survey during the summer of 2012, sediment cores were collected for grain size analysis from about 160 sites in the Lower Laguna Madre. Selected sites were also analyzed for organic carbon content by ashing.

P490 **Marine Science**

Variation in elemental composition of the seagrass *Halodule wrightii* from the Lower Laguna Madre

Esteban Triplett*, Jason Parsons, Joseph Kowalski and Hudson DeYoe

Seagrasses like other plants have particular nutrient requirements. Micronutrient composition may be a useful tool to assess the condition of seagrass plants but little synoptic data exists. In conjunction with a seagrass survey in the Lower Laguna Madre during the summer of 2012, seagrass leaf and rhizome tissue was collected for elemental analysis from a subset of 160 sites used in the survey. Elemental composition of the plant tissue was analyzed by ICP-MS.

495 **Marine Science**

San Martin Lake: Loved by many, studied by few.

Wendy Rogers* and Dr. Hudson DeYoe, The University of Texas-Pan American

San Martin Lake (SML) is a heavily fished shallow water estuarial bay connected to the Brownsville Ship Channel in south Texas. SML water quality is influenced by tidal inputs on the eastern end of the lake and by water treatment discharge and irrigation runoff on the western end of the lake. Unfortunately, little data exists to characterize the physico-chemical conditions or biology of SML. We hypothesize that conditions within this lake are seasonally favorable for the proliferation of harmful algal blooms, and in particular, *Karenia brevis* (red tide) blooms. This study is a year-long investigation of the water quality, nutrient and phytoplankton dynamics within SML. In addition, bioassay trials are planned to assess the waters from SML and nearby sites for their ability to support *K. brevis* growth. Based on samples collected since August 2012, north to south gradients in salinity (increasing), nutrient and chlorophyll (both decreasing) in SML are evident.

496 **Marine Science**

To Catch as Catch Can: Using otoliths to determine age of red snapper, *Lutjanus campechanus,* for use in developing effective management in Texas waters

Nicole Carrillo, Texas A&M at Galveston

Since red snapper, Lutjanus campechanus, were declared overfished in the late 1980's, there has been major controversy over how to best manage the stock to allow it to be recovered by 2032, the goal of the Gulf of Mexico Fishery Management Council. With growing fishing pressure from the recreational sector and the majority of the catch age ranging between four and six years, red snapper are being harvested before they are able to reach peak maturity levels. My research focused on using the measurement of otoliths to determine the actual age of red snapper caught off the upper Texas coast by recreational fishers on head boats. An indicator that a fish stock is overfished is the lack of ageing of species. Since research shows little to no correlation between length and age, the actual ages will provide knowledge of the current red snapper status to determine the need for new state regulations to best manage the stock. This data will provide a much needed characterization of the head boat industry, providing an insightful look at the catch-effort and size of red snapper landed. With shrinking federal red snapper seasons, it is important to determine what percentage of the total allowable catch these recreational anglers contribute annually.

497 **Marine Science**

An experimental test of the effects of disturbance frequency on the diversity of artificial reef fouling communities

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Disturbance magnitude and frequency are recognized as two of the principle factors influencing terrestrial and inter-tidal communities, but disturbance effects have not been comprehensively studied in sub-tidal communities. Biofouling communities consist primarily of shell-bearing and encrusting species that attach directly to substrate increasing the complexity of inhabited structures, associate sessile species that live on or within the primary species, and mobile species that migrate throughout the community. These communities are often the most important secondary producers of sub-tidal reefs along the South Texas coastline. In this study a series of steel plates were affixed on the Texas Clipper reef off the coast of South Padre Island, Texas and used as settlement plates for the recruitment of biofouling species. Equal magnitude disturbance treatments varying in frequency were applied over an experimental period of 140 days, after which the plates were removed from the reef and the biota of each plate were quantified and identified to the lowest possible taxonomic level. It was hypothesized that increasing disturbance frequencies would increase species richness until disturbance reached a critical threshold that inhibited pioneer species survival, in accordance with the Intermediate Disturbance Hypothesis (IDH). Preliminary results indicate a trend of increasing species richness and decreasing species evenness as disturbance frequency increases from a zero disturbance treatment (control) to frequencies of five weeks and ten weeks. A more robust multivariate statistical analysis is planned to test for differences in community structure among the disturbance treatments.

503 **Marine Science**

The effects of a red tide, *Karenia brevis* episode on the benthic macroinvertebrate communities of South Padre Island,Texas

Liana Lerma*, David W. Hicks, University of Texas at Brownsville, Brownsville, TX.

In September 2011, a prolonged (three month) red tide event (*Karenia brevis*) occurred on South Padre Island, Texas resulting in significant fish mortality and irritating aerosols. While there is evidence that *Karenia brevis* toxins have detrimental effects on fish, wildlife, and human populations, lower trophic level effects are largely undocumented. The benthic macroinvertebrate community inhabiting the swash zone of sandy beaches is an important linkage between marine and terrestrial food webs. This community would likely experience chronic exposure to red tide toxins during prolonged events given its intertidal shoreline position and dependence upon filter feeding. To assess the potential effects of *Karenia brevis* on the swash zone community, sampling efforts were conducted from six 0.78 km stretches of beach prior to and after elevated cell count concentrations. A two way nested ANOSIM was used to compare before and after event swash-zone communities with site nested within sampling interval. Preliminary results indicate that the before and after event communities were significantly different (ANOSIM Global R=0.991, p=0.002) with species abundances for *Donax variabilis* and *Ancinus depressus* increasing following the red tide event while abundances for *Haustorius* sp. and *Scolelepis squamata* decreased. However, this 31% dissimilarity among the before and after event swash zone communities appears to be within range of natural seasonal variation and therefore unlikely attributable to the red tide effects.

515 **Marine Science**

The use of underwater surgical techniques to reduce mortality in fish studies utilizing acoustic tagging

Andres Garcia*, Richard Kline, David Hicks, Carlos Cintra-Buenrostro, University of Texas at Brownsville, Brownsville, TX and Dale Shively, Texas Parks and Wildlife Artificial Reef Program, Austin, TX.

Conducting tag and release studies on offshore reef fish requires a researcher to overcome two main obstacles: barotraumas and predation. Reef fish taken from as little as 10-15 m suffer from the effects of barotrauma and are subject to intense predation upon release. In the present study, red snapper *Lutjanus campechanus* were surgically implanted with ultrasonic telemetry tags for a comparison study of site fidelity between two artificial reef sites, the Texas Clipper Reef and the South Padre Island Reef. Fish were captured with underwater hook and line fishing on SCUBA at 20-30 m depth. Implantation surgeries were performed underwater at depths of 20-25 m, to eliminate barotrauma. After surgery, fish were held in baskets and observed by divers to avoid predation and ensure healthy release. Thirty-two red snapper were surgically implanted with acoustic telemetry tags on the two reef sites. No mortality was observed as a result of the surgical procedure and all tagged fish displayed multiple detections and depth readings for 7 days following the surgical procedure. By using these two techniques, we avoided the effects of barotrauma and predation by fish such as barracudas *Sphyraena barracuda* that were observed to cause near 100% mortality in fish brought to the surface and released.

P537 **Marine Science**

Seagrass abundance patterns in the Lower Laguna Madre.

Carmen Gomez*, Jack McDaniel*, Xenia Brianna Gonzalez, Isaac Peña, The International Baccalaureate Program at Lamar Academy, McAllen I.S.D., McAllen, Texas, Hudson R. DeYoe, Department of Biology and the Center for Subtropical Studies, The University of Texas-Pan American, Edinburg, Texas, John Garcia, Edwin Quintero, Department of Biology, The University of Texas-Pan American, Edinburg, Texas and Joseph Kowalski, The International Baccalaureate Program at Lamar Academy, McAllen I.S.D., McAllen, Texas, and Department of Biology and the Center for Subtropical Studies, The University of Texas-Pan American, Edinburg, Texas.

There has been much change in Lower Laguna Madre seagrass distribution and abundance over the last fifty years. Surveys since 1988 have documented loss of seagrass acreage while *Thalassia testudinum* (turtle grass) and *Syringodium filiforme* (manatee grass) have expanded their areas at the expense of *Halodule wrightii* (shoal grass), the dominant species prior to the 1940s. A bay-wide survey of the Lower Laguna Madre (LLM) seagrasses was undertaken during summer 2012 to investigate the premise that the freshwater discharges to the LLM accompanying Hurricanes Dolly (2008) and Alex (2010) have further altered the distribution and abundance of its seagrass communities. This study encompassed 180 stations distributed throughout the lagoon. At each station, seagrass abundance was estimated by recording percent cover and species composition. In addition, benthic cores were collected for seagrass biomass and sediment grain size analysis and routine water quality data were recorded. Percent cover and biomass data will be presented showing that *H. wrightii* has once again become the dominant seagrass in the Lower Laguna Madre (present at 51% of stations). Mean total biomass was 146.16 g m^{-2} (SE = 11.53; N = 297) which comprised 48% of all vegetated stations. Unvegetated sediments accounted for 30% of all stations. Turtle grass (11% of all stations), once found as far north as the Arroyo Colorado, was found exclusively in the southernmost part of the LLM, with average biomass of 736 g m^{-2} (SE = 82.44; N = 50), while manatee grass (2% of all stations) was more even restricted being found only near the Brazos-Santiago Pass tidal inlet (average total biomass = 365 g m^{-2} (SE = 35.55; N = 25). Widgeon grass (6% of all stations) had a mean total biomass of 59.02 g m^{-2} (SE = 13.94; N = 17). Shoal grass average total biomass on the west side of the LLM (128.67 g m^{-2}; SE = 21.88) was significantly different from that of the east side (68.67 g m^{-2}; SE = 17.80) (Mann-Whitney U = 822; P = <0.001). Biomass often followed depth, but there were no significant correlations (P = >0.05). The prolonged period of hyposaline conditions in the LLM following Hurricane Alex were sufficient to cause seagrass mortality to limit the areal distribution and abundance of turtle grass and manatee grass and allow shoal grass to expand its distribution.

P538 **Marine Science**

Primary productivity in the Lower Laguna Madre and Arroyo Colorado, Texas.

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The Arroyo Colorado (AC) is a distributary of the Rio Grande and acts as a conduit for nutrient-rich agricultural runoff and treated wastewater that drains to the Lower Laguna Madre (LLM) estuary. As a primary source of nutrient loading to the LLM, the AC delivers nutrients such as inorganic nitrogen and phosphorus that are often in demand by estuarine phytoplankton. These nutrients are carried to the LLM in abundance by the AC, enriching the water column and allowing phytoplankton to increase rates of primary productivity and phytoplankton abundance before reaching the tidally-flushed LLM. As an area of mixing, the tidal portion of the AC is an ecotone where freshwater and estuarine phytoplankton communities mix. To assess the primary productivity patterns under the influence of different nutrient regimes, we measured primary production by the light/dark bottle method to test the hypothesis that primary productivity in the AC would be greater than more distant LLM sites away from the AC confluence. Primary production measurements were made at four locations using ship-board incubations. Production was greatest near the outfall of the AC in the LLM estuarine waters of Green Island (342 µg O_2 hr^{-1} $µg^{-1}$ Chl *a*), an area northeast of the AC mouth and subject to the prevailing southeasterly wind-driven currents. Surprisingly, production at the low salinity AC upstream site was significantly less than that of all other sites (12 µg O_2 hr^{-1} $µg^{-1}$ chl *a*), despite chlorophyll concentrations (19.8 µg l^{-1}) three to four times that of all other stations. Salinity at the AC upstream site (7 PSU) may have had a negative effect on the freshwater phytoplankton community there.

P539 **Marine Science**

Phytoplankton nutrient limitation in the Brazos-Santiago Pass, South Padre Island, Texas.

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Macronutrients, such as nitrogen and phosphorus are needed for photosynthesis. When there are inadequate amounts of nutrients primary production is limited, often by nitrogen in marine waters. In order to determine which nutrient (or combination) may limit phytoplankton primary productivity in a South Texas tidal pass, we sampled the waters of the Brazos-Santiago Pass, Texas during June 2012 and initiated a microcosm experiment to test the effects of addition of nitrogen (+N), phosphorus (+P), and a nitrogen and phosphorus combination (N+P) on plankton primary production rates. Replicate (N=3) two-liter carboys per treatment were incubated for two days in a 7 m^3 outdoor tank with constantly flowing seawater. Temperature during the experiment ranged from 25 to 31 °C and water column salinity was 37 ppt. There were significant differences among all treatments (One-Way ANOVA $F_{19, 3} = 17.72$, P <0.001). The +P treatment yielded the highest photosynthetic rates, adjusted for chlorophyll (Chl) (0.42 mg O_2 µg chl *a* hr^{-1}, SE = 0.08). Primary production rates in all other treatments were more than four times lower. Production rates in the +N treatment were 0.09 mg O_2 µg chl *a* hr^{-1} (SE = 0.013). Surprisingly, the production in the controls were greater (0.05 mg O_2 µg chl *a* hr^{-1}, SE = 0.01) than those of the +N+P treatment (0.02 mg O_2 µg chl *a* hr^{-1}, SE = 0.00). Interestingly, Chl *a* biomass across treatments did not follow production trends, where the +N+P treatment had a mean Chl concentration of 11.07 µg chl *a* l^{-1} (SE = 0.09), followed by that of the +N treatment (7.24 µg chl *a* l^{-1} SE = 1.88). Chl biomass in the controls and +P treatment were each less than two. Our finding that the phytoplankton community of the Brazos-Santiago Pass is phosphorus-limited is not typical for marine waters. Marine phytoplankton are often believed

to be nitrogen limited, so our result was surprising. In previous years, we have found N and P co-limitation and N-limitation during other years. This year-to-year variability warrants further study.

P549 **Marine Science**

Development and implementation of Sargassum Early Advisory System (SEAS): An investigation of the loop system, warm water eddies, currents and energy that create Sargassum locomotion

*Brandon N. Hill, Captain Webster

The work of SEAS thus far is three fold; to refine the details of the loop system that we propose sargassum takes throughout its life cycle, to increase the accuracy of our prediction of this cycle and to create an alternative disposal option of the sargassum after it has washed up on the beaches. There is evidence suggesting the existence of a loop system that is both wind and ocean current driven. All along this system the sargassum can be run aground, which greatly disrupts the tourism industry at these locations. The SEAS predictive model is 90% accurate even when predicting sargassums' arrival 6 months out! This accuracy is due to a multitude of techniques, including the use satellite imagery, beach cameras, weather buoys, and oceanic drifters. Brandon Hill's contribution to the predictive system has been in using the oceanic drifters to increase accuracy and add evidence to support the existence of the loop system. These drifters have the capability to measure GPS position, water temperature and both vertical and horizontal velocity. They move through the ocean much like sargassum. The third stage of the research involves finding an alternative use and disposal practices for the beached sargassum. The aim of is to create a community where we no longer look at sargassum as an eyesore, but as a critical component in a multitude of environments. This mid-ocean oasis, sea turtle refuge, food source and eventually vital part of our beach health should be appreciated rather than despised.

567 **Marine Science**

GoMexSI: An international estuarine and marine species interaction database for a large sub-tropical marine ecosystem

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While the assessment of the biodiversity of the subtropical Gulf of Mexico ecosystem has recently made great advances, availability of easily accessible species interaction data lags behind. These interaction data are needed to examine ecosystem trophic structure, or to examine the network topology of the Gulf ecosystem, among other uses. Collection of species interaction data is very expensive, particularly at the scale of a large marine ecosystem (LME), thus it is extremely important that existing data be preserved and made easily accessible. Data on species interactions from the Gulf of Mexico are currently being compiled into a database, which will link, and share data with local and global efforts such as Gulfbase, FishBase, SeaLifeBase, Lifemapper, Encyclopedia of Life, and the Data Conservancy. We report on the Gulf of Mexico Species Interaction (GoMexSI) database, a spatially compliant database constructed using PostgreSQL and PostGIS. A companion webpage is also under development. To date, 747 references to trophic interactions of fishes from the Gulf have been assembled, and eleven scientists have contributed raw data to the effort. Geo-coding, and collection of metadata lite, a condensed version of customary metadata that answers the "who, what, where, when, and why", has been performed for all references, while ~60% of the references have had habitat data digitized and standardized using the Coastal and Marine Ecological Classification Standard. Currently, from data entry efforts and contributed data, we have data on almost 15,000 predator specimens, and almost 40,000 trophic interactions have been recorded.

575 **Marine Science**

Functional aspects of the placoid scales surrounding the superficial neuromast of the bonnethead shark (*Sphyrna tiburo*).

Martin Donley

Superficial neuromasts in a shark's skin detect close proximity vibrations in the water. Surrounding scales may play a role in directing water toward these neuromasts, thereby increasing their sensitivity. This study digitally documents the relationship of superficial neuromasts and surrounding scales using 1) whole-mounts of shark skin in which the scales are stained and viewed using a light microscope, 2), sections of demineralized and stained shark skin viewed using a light microscope, and 3) whole pieces of shark skin viewed using a scanning electron microscope. From this positional and dimensional data a representative model will be constructed. This model will be used to determine how these scales alter the flow of water and how this altered flow is affected by a stimulus. At the time of this presentation, preliminary data that has been gathered from the bonnethead sharks (*Sphyrna tiburo*) and the hypotheses that have been formulated regarding the mechanics of the altered flow will be presented. This presentation will be used to seek feedback regarding the hypotheses and potential applications of this developed technology. This technology could function to provide vessels with a close proximity mechanical sensor that would warn vessels of objects or organisms in the water.

615 **Marine Science**

Investigation of the Gulf of Mexico as a nursery ground for *Sargassum*

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The Texas Gulf Coast consists of 367 miles of coastline, the vast majority are light brown sandy beaches. The slight slope of these beaches creates many large expanses of beach where the public can enjoy a variety of activities, such as beach combing, surfing, swimming, and surf fishing. *Sargassum,* commonly known as seaweed, can create a significant barrier to tourist trying to enjoy the beach and surf zone. Texas coastal managers struggle to keep the beaches relatively clear of *Sargassum*. Many of the *Sargassum* episodes appear with little or no warning. Each episode of the *Sargassum* can last days, weeks, or months specifically during the tourist season. Texas A&M University at Galveston scientists, have been investigating the use of Landsat Data Continuity Mission (LANDSAT) Imagery to measure the amount of *Sargassum* that enters into the Gulf of Mexico through the Yucatan Strait versus the amount that exits the Gulf of Mexico through the Florida Strait. The surface currents are provided by the Gulf of Mexico Loop Current. These two areas of investigation are covered by four

satellite footprints that cover virtually 100% of the entrance and exit into the Gulf of Mexico. When *Sargassum* is present these images will produce green irregular lines that provide exact location of the slicks. Between 1985 and 2012 there is a visual increase of *Sargassum* as it exits through the Florida Straits supporting the theory that the Gulf of Mexico is a nursery for *Sargassum*.

324 **Mathematics**

The Arithmetic-Geometric Mean Inequality in Precalculus

Elsie M. Campbell* and Dionne T. Bailey*, jointly

The Arithmetic-Geometric Mean Inequality is not traditionally used in Precalculus courses. We will demonstrate its use in optimization problems which are usually solved with calculus methods. This allows Precalculus students the opportunity to be exposed to calculus problems before learning calculus techniques.

355 **Mathematics**

Can't Stop: When things get a bit "dicey"

Colin Williams*, Seth Reed, Kathleen Garza, Liliana Guia, Dr. Stefan T. Mecay, Schreiner University, Kerrville, TX

Can't Stop is a fun dice game that is easy to learn, yet difficult to master. There are a variety of strategies and tough decisions to make after each roll of the dice. Is it better to play it safe or push your luck for one more roll? Through multiple trials and using some basic probability and game theory, different unique strategies were developed. The rules of the game, the probabilities involved, some of the basic strategies considered, and the unique strategies which evolved will be explored.

605 **Mathematics**

How does the loss due to follow up affect the results of survival analysis?

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Kaplan-Meier survival analysis is used in medical research to estimate the median survival time 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 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 affect of 0, 12.5, 25, and 50% censorship on estimation of the median survival. For a known median survival of 14 months the estimates based on linear regression were 14.2, 16.2, 19.4, and 30.6 months, respectively (average of five trials). The estimates based on Kaplan-Meier survival analysis were 28, 26, 25, and 21 months, respectively (one trial). The linear regression method used observed terminal events and ignored censorship. The Kaplan-Meier method stratified the data, counted censorship as survival within a stratum, and calculated cumulative survival as a series of products of survival at each stratum. In preliminary estimates comparing linear and exponential decay without censorship, linear regression accurately estimated the half-life for both, Kaplan-Meier overestimated. For censorship rates from 12.5 to 50%, linear regression increasing overestimated half-life as censorship increased for linear decay, but was accurate and precise for exponential decay. Kaplan-Meier overestimated but was relatively precise for both linear and exponential decay.

P327 **Neuroscience**

Hydroxynonenal intramolecular crosslinking of neurofilaments

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PURPOSE: Lipid peroxidation generates reactive aldehydes, most notably hydroxynonenal (HNE), which covalently binds amino acid residue side chains leading to protein inactivation and insolubility. Specific adducts of lipid peroxidation have been demonstrated to be intimately associated with pathological lesions of Alzheimer disease (AD), suggesting oxidative stress is a major component in the disease. DESIGN METHODS: Here, brain tissue from AD and control patients was examined by immunocytochemistry and immunoblotting for evidence of HNE-crosslinking modifications by using an antibody specific for a lysine-lysine crosslink. RESULTS: While no immunolabeling of neuritic plaques or neurofibrillary tangles was detected, strong labeling of axons was noted. Immunoblotting showed the crosslink was restricted to neurofilament medium and heavy subunit but did not change their molecular weight. CONCLUSION: These findings directly implicate lipid crosslinking peroxidation products as accumulating not in the lesions but rather in lysine rich neurofilaments in the cytosol. Surprisingly the modification was restricted to intramolecular sites.

356 **Neuroscience**

The role of cytokines on the inflammatory status of the amygdala, hippocampus and hypothalamus following quercetin administration in a diabetic rat model

Muraya L Gonzalez*, Carlos A. Garcia, University of the Incarnate Word, San Antonio, TX and Sara Mahoney, Texas A&M - Kingsville

Cognitive impairments are well documented in diabetics. The amygdala, hippocampus and hypothalamus are brain regions that regulate vital neurocognitive functions. The purpose of this study was to investigate the effect of quercetin (Q) on the inflammation of the hyperglycemic mammalian rat brain. The pro-inflammatory cytokine Interleukin 6 (IL-6), and the anti-inflammatory cytokine Interleukin 10 (IL-10) were measured in these brain regions of streptozotocin-induced diabetic Long Evans rats. Age and sex-matched rats were separated into groups: control, diabetic, and diabetic Q-fed. Three months after the onset of diabetes, all groups were sacrificed and brains dissected. IL-6 and IL-10 were measured by enzyme-linked immunosorbent assays in tissue homogenates. The results indicate that hyperglycemia induces inflammation in the three brain areas examined by increasing IL-6 (5X in amygdala and hippocampus), and a decrease in the levels of IL-10 (61% in amygdala, 27% in hippocampus, 32% in hypothalamus). Quercetin decreased the concentration of IL-6 in the amygdala (76%) and hippocampus (79%), but had no effect in the hypothalamus and increased the IL-10 concentration in the three brain areas tested. This data provides evidence that hyperglycemia alters the inflammation status of the three brain regions and quercetin decreases the hyperglycemia-mediated inflammation. The results indicate that IL-6 -mediated Jack-STAT pathway may be

stimulated in brain cells leading to neuronal dysfunction in diabetics. This data is useful in the development of novel drug therapies for the millions of diabetics at risk to develop mood changes, memory loss and other cognitive deficits.

360 **Neuroscience**

Basal orbitofrontal IL-6 facilitates reversal learning in the rat

Jennifer Donegan*, Milena Girotti, Miranda Morgan, David Morilak, University of Texas Health Science Center at San Antonio, San Antonio, TX

Cognitive flexibility, or the adaptive ability to modify behavior in response to environmental change, is impaired in a heterogeneous group of psychiatric disorders, including depression. Stress is a risk factor for depression and we have shown that stress impairs cognitive flexibility. Specifically, chronic intermittent cold (CIC) stress impairs reversal learning, a form of cognitive flexibility mediated by the orbitofrontal cortex (OFC). Excessive cytokine signaling has been implicated in both the stress response and the pathology of depression; therefore, we originally hypothesized that increases in brain cytokines may contribute to the depression-like deficits in cognitive flexibility caused by stress. We tested this hypothesis by administering a neutralizing anti-IL6 antibody, *i.c.v.*, throughout CIC stress. We were surprised to find that IL-6 neutralization did not prevent the stress-induced impairment but produced a deficit in both stressed and non-stressed animals. Further, we found that this effect was region-specific as an acute injection of the anti-IL6 antibody into the OFC, but not the striatum, recreated the deficit. Next, we wanted to determine if increasing OFC IL-6 could improve reversal learning in animals compromised by stress. Using viral vector-mediated gene delivery to over-express IL-6, we found that increasing OFC IL-6 during stress prevented the formation of cognitive inflexibility. Further, an acute injection of IL-6 into the OFC was sufficient to reverse the detrimental effect of CIC stress on reversal learning. Ongoing studies will identify the cell types and downstream signaling pathways involved in the IL-6 facilitation of reversal learning to further elucidate the biological basis of cognitive flexibility.

P415 **Neuroscience**

Beta-catenin, an early develomental transcription factor, is upregulated in the Lumbriculid central nervous system during nerve regeneration.

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Regeneration recapitulates the events of early development in adult tissues. *Lumbriculus variegatus,* an aquatic oligochaete, is an ideal model for regenerative studies, capable of regenerating an entire worm from as little as three segments of tissue. Lumbriculus regenerates using epimorphosis and morphallaxis. Morphallaxis, a reorganization of existing tissues without new cell division, is essential to the emergence of appropriate functional patterns within the Lumbriculid central nervous system (Zoran and Martinez, 2009). Previous studies in our lab have demonstrated that epimorphic regeneration of a fully formed head, preceeds morphallaxis within the original worm fragment. One of the major hypotheses in our lab is that these regenerative processes are orchestrated in an anterior-posterior fashion beginning with the expression of developmental genes in newly regenerated heads. Western blot analysis demonstrates that *β-catenin,* a transcription factor that is directly responsible for transcription of anterior specific genes, is differentially expressed in regenerating heads. Moreover, immunohistochemical analysis reveals that *β-catenin* expression is increased two-fold just three hours post-amputation. Taken together, this data suggests a role for *β-catenin*, in the early stages of Lumbriculid regenerative process. Further investigation will develop our understanding of the cellular mechanisms involved during Lumbriculid regeneration.

P426 **Neuroscience**

Difference in respiratory exchange ratio and CRF mRNA leves response to social housing conditions in Syrian female hamsters

Li An Fong*, John Shannonhouse, Bryan Clossen, Ross Hairgove, Lauren Mertesdorf, Margie Patel, Caurnel Morgan, Texas A&M University, College Station, TX

Emotional status plays an important role in energy balance, but the underlying mechanisms are poorly understood. The purpose of this study was to establish a model to investigate the relationship between emotional status and energy balance in Syrian female hamsters. The hypothalamic-pituitary-adrenal (HPA) axis is well known to influence emotion and energy balance. The neuropeptide, corticotrophin-releasing factor (CRF), which is released from hypothalamic neurons, stimulates the anterior pituitary gland to secrete adrenocorticotrophic hormone (ACTH), which in turn stimulates corticosteroid secretion from the adrenal cortex. Syrian hamsters were socially grouped (2/cage) from postnatal day 21 (PD21), or they were socially separated (1/cage) from PD21 or PD70, PD84 or PD21 after weaning. CRF, relative to control ActB, mRNA levels were assessed by RT-PCR from RNA extracted from the caudal hypothalamus. Respiratory exchange ratio (RER) was obtained from calorimetry measurement through CO2 output and O2 uptake. Based on whole hypothalamus data, CRF/ActB mRNA levels are lower in socially separated than socially paired groups. In addition, RER is lower in socially paired than socially separated groups. In summary, CRF mRNA levels in the caudal hypothalamus and RER were affected by social housing conditions after weaning.

P476 **Neuroscience**

Oxidative Stress and Apoptosis in the Progression of Alzheimer's Disease in the Hippocampal CA1 Region

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Oxidative stress and apoptosis play major roles in pathogenesis of Alzheimer's disease (AD). This study assessed, *in silico*, oxidative stress measures as reported on frontal cortex homogenates and associated indices of apoptosis. We simulated the CA1 using transcriptomes from age matched controls and incipient, moderate, and severe AD linked with reactions in a biosimulation model; to derive parameters for a deterministic kinetic model. The apoptosis pathway and one-carbon-glutathione pathways were used to simulate oxidative stress and cell death. Time series simulations were run using ordinary differential equations to generate level values for reactants and flux values for reactions. Reduced glutathione (GSH) increased 50%-75% and glutathione-disulfide (GSSH) 70%-215% in AD; the GSH/GSSG ratio was highest in control and lowest in incipient and moderate AD. Glutathione peroxidase flux increased in AD 20%-250%. Glutathione reductase flux increased 48%-90%. Glutathione-S-transferase flux increased 41%-77%. Superoxide-dismutase fluxes reduced in a gradient fashion from incipient to severe AD. Catalase flux decreased most in incipient and then increased in severe

AD. For apoptosis, active-caspase-3 level and flux were greatest in severe AD. Other indices of apoptosis were also increased in AD, e.g., DNA damage/cleavage, cytochrome oxidase C release, and other caspase activities. These results on glutathione pathway are discrepant with enzyme activities reported for the frontal cortex in AD, and can be explained as regional differences and that *ex vivo* studies use identical substrate concentrations, whereas, biosmulated substrate levels arise from network behavior. The apoptosis-marker results are consistent with the abortosis hypotheses for AD.

P498 **Neuroscience**

Comparing the effectivenes of acquisition rehearsal learning, and retrieval rehearsal learning, in the creation of long-term declarative memories.

Michelle Hundt, Louie Morsy, Patrick Scholl*, Fidelma O'Leary. St. Edward's University, Austin, Tx

Long-term memory is categorized as a declarative (explicit) or procedural (implicit), as well as short-term (mins) and long-term (hours). Declarative memory requires conscious recollection of facts (Squire, 2004). However, little is known about optimizing memory acquisition. This study aims to examine whether learning by acquisition rehearsal, or by retrieval rehearsal, is more effective in creating long-term declarative memories in humans. Subjects (male and female), 18 to 25 years old, were pre-screened for altered stress or sleep levels, as both can impact normal memory formation (Alhola, 2007; Sandi, 2007). Subjects were assigned to one of two learning groups, AR, acquisition rehearsal, and RR, retrieval rehearsal. Group AR was shown a neutral word list six times/30sec. Group RR was shown a neutral word list 3 times then asked to recall/retrieve the list 3 times. Twenty-four hours later both groups were scored for memory. Group AR's had an average success rate of 50%. In comparison, group RR scored significantly higher, with an average success rate of 93.3%, and with no score below 70%. The difference between groups is statistically significant (t-test, $p<0.05$, $p=0.033$). The data indicates that retrieval rehearsal is more effective than acquisition rehearsal in the creation of long-term declarative memories. This experiment provides an important insight into optimizing acquisition of long-term declarative memories. For example, students whose success typically relies on declarative memory consolidation may utilize this information to more effectively acquire and consolidate long-term declarative memories.

P510 **Neuroscience**

Examination of the effects of physiological stress and cortisol levels on the acquisition of long-term declarative memories.

Paloma Reinoso*, Vanessa Neutzler, and Fidelma O'Leary, St. Edward's University, Austin TX

Previous studies have indicated an effect of stress on learning; however, the relationship between stress, stress hormones and memory in humans has yet to be fully elucidated. The hippocampus is required for declarative memory consolidation, and studies suggest that cortisol, a steroid stress hormone which crosses the blood-brain-barrier, binding to glucocorticoid receptors in the hippocampus, may negatively impact learning. The present study examines the effect of stress-induced endogenous cortisol release on the acquisition of long-term declarative memories in humans. Experiments were conducted from 1:30- 4:30 p.m., to offset fluctuations in cortisol levels normally seen in the morning. Male and female subjects (n= 56, age 18-24 yrs) were asked to engage in memory acquisition and retrieval tasks, while experiencing a stressful or neutral (control) stimulus. To induce stress the socially evaluated cold-pressor stress test was used with a room temperature water bath as control. Physiological indicators of stress were monitored throughout, and saliva samples were gathered before and during memory consolidation. Memory performance was assessed by free recall 24h later. An enzyme-linked immunosorbent assay (ELISA) was used for the quantitative analysis of salivary cortisol. Memory performance and physiological vitals were analyzed. Physiological stress induction was confirmed, as cortisol levels increased and heart rate was found to be significantly higher than baseline in stressed subjects. Preliminary data indicates decreased memory performance in stressed subjects compared to controls.

523 **Neuroscience**

Transcranial laser stimulation of cognitive and emotional functions in humans

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This talk describes the first controlled study demonstrating the beneficial effects of transcranial laser stimulation on cognitive and emotional functions in humans. Photobiomodulation with red to 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 the forehead using the laser diode CG-5000, which maximizes tissue penetration and has been used in humans for other indications. We tested whether low-level laser stimulation produces beneficial effects on frontal cortex measures of attention, memory and mood. Reaction time in a sustained-attention psychomotor vigilance task was significantly improved in the treated ($n = 20$) vs. placebo ($n = 20$) groups, especially in high novelty-seeking subjects. Performance in a delayed match-to-sample memory task showed also a significant improvement in treated vs. control groups as measured by memory retrieval latency and number of correct trials. The Positive and Negative Affect Schedule, which tracks self-reported positive and negative affective (emotional) states over time, was administered immediately before treatment and two weeks after treatment. The results showed that overall affect improved significantly in the treated group due to more sustained positive emotional states. These data imply that transcranial laser stimulation could be used as a non-invasive and efficacious approach to increase brain functions such as those related to cognitive and emotional dimensions. This innovative approach could lead to the development of non-invasive, performance-enhancing interventions in healthy humans and in those in need of neuropsychological rehabilitation.

P544 **Neuroscience**

Comparing the effects of glucocorticoids and mineralocorticoids in the stimulation of embryonic zebrafish neurodevelopment and nestin gene expression

Eugene C. Nwankwo* and Amaris R. Guardiola, Angelo State University, San Angelo TX

Zebrafish embryos are an ideal model system for studying how hormones impact the ability of the CNS to proliferate during embryogenesis. The goal of this study is to determine how the glucocorticoid and mineralocorticoid hormones affect neurogenesis. To test this, zebrafish embryos will be exposed to low concentrations of hormones and then subjected to whole mount *in situ* hybridization to detect nestin mRNA expression. Nestin, an intermediate filament, serves as a marker for neuronal stem cells and precursor cells. Microscopic observations and data are expected to reveal significant changes in the morphological appearance and development patterns of the central nervous system of the zebrafish embryos as opposed to the untreated control organisms. Understanding this process will contribute to the understanding of the role of specific hormones in neurogenesis.

553 **Neuroscience**

Cross-talk and signalling between ethanol and acetone during rapid exposure using Drosphila Melanogaster as a model organism

Sarai Salinas and Enrique Massa, Ph.D.

A number of molecular targets including ion channels have been implicated in the acquisition of tolerance to alcohol-induced sedation. Behavioral characterization of *slowpoke* ion channel mutants in *Drosophila melanogaster* during ethanol exposure demonstrated that tolerance is multiphasic and the *slowpoke* channel plays a role only during the late phase of tolerance acquisition (approximately 24 hours post-exposure). Similarly, cross-tolerance and cross-sensitization has been shown to be common for several drugs of abuse. While it is common to observe cross-tolerance and cross-sensitization reciprocally between drugs of abuse, it is not uncommon to see that phenomenon occur in a unidirectional manner. We are studying cross-talk between different drugs using ethanol and acetone as model drugs of abuse. Exposure of wildtype Canton S flies initially to ethanol (60%) and subsequently to acetone (6%) resulted in minimal cross-tolerance to acetone. However, exposure of wildtype flies to 6% acetone followed by 60% ethanol induced significant cross-sensitization to ethanol. Additional analysis of hyperactivity during drug exposure suggests that initial acetone exposure prior to ethanol exposure significantly increases hyperactive behavior in flies undergoing a secondary exposure to ethanol. Analysis of *slowpoke* mutant flies demonstrated the *slowpoke* ion channel is not involved in cross-talk between acetone and ethanol and suggests there are other molecular targets in cross-talk between the two studied drugs.

326 **Physics**

Phase Diagram for Magnon Condensate in Yttrium Iron Garnet film

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Recently, magnons, which are quasiparticles describing the collective motion of spins, were found to undergo Bose-Einstein condensation (BEC) at room temperature in films of Yttrium Iron Garnet (YIG). Unlike other quasiparticle BEC systems, this system has a spectrum with two degenerate minima, which makes it possible for the system to have two condensates in momentum space. Recent Brillouin Light scattering studies for a microwave-pumped YIG film of thickness $d=5$ μm and field $H=1$ kOe find a low-contrast interference pattern at the characteristic wavevector Q of the magnon energy minimum. In this report, we show that this modulation pattern can be quantitatively explained as due to unequal but coherent Bose-Einstein condensation of magnons into the two energy minima. Our theory predicts a transition from a high-contrast symmetric phase to a low-contrast non-symmetric phase on varying the d and H, and a new type of collective oscillations.

337 **Physics**

Intensity-resolved above threshold ionization of Xenon

N. Hart, J. Strohaber, G. Kaya, A. A. Kolomenskii, and H. A. Schuessler

Photoelectron yields from the ionization fo xenon with linearly polaized, unchirped 50 fs laser pulses were measured for a set of laser intensities using an above threshold ionization (ATI) apparatus. All laser parameters other than the radiation intensity were held constant over the set of intensity measurements. A recently developed deconvolution algorithm was used to retrieve the photoelectron ionization probability from spatially average data in three dimensions. Finally, an error analysis was performed to determine the stability and accuracy of the algorithm as well as the quality of the data. It was found that the algorithm produced greater contrast for peaks in the ATI spectra where atom specific resonant behavior is observed. Additionally, the total yield probability showed that double ionization was observed in the ionization yields. The error analysis revealed that the algorithm was stable under the experimental conditions for a range of intensities.

352 **Physics**

Light Curves & Rotational Periods for Main Belt Asteroids

Cassidy Cantu, Hardin-Simmons University

771 Libera is a Main Belt asteroid located between the orbits of Mars and Jupiter. It has an average distance of 2.7 AU from the Sun, orbital period of 4.3 years, and orbital inclination of 15^{o}. It has a diameter of 29 km and albedo of 13%. A two-night series of FITS images of this asteroid were analyzed using aperture (differential) photometry to measure the light curve. From the light curve a rotation period of $\sim 6^{h}$ was determined. In addition using the online 0.41-m Schmidt –Cassegrain with CCD camera at the Ironwood North Observatory (Phoenix), a series of FITS images of two other Main Belt asteroids were taken. These, too, were analyzed using aperture photometry to determine their light curves and rotational periods.

373 **Physics**

Detection of chromosome optical activity by light scattering from dinoflagellate nuclei

Jianping Liu, George W. Kattawar, Texas A&M University, College Station, TX

One of the most prominent properties of *dinoflagellates* is their large sized and highly chromatic nucleus, which contains dozens of cylindrically shaped chromosomes. With such high chromatic concentration, these chromosomes condense into ordered helical structures and were acclaimed to be responsible for the large circular polarization effects observed in the light scattering from dinoflagellates. In previous research, a thin helix model of a chromosome was used to compare the Discrete Dipole Approximation (DDA) and the analytical Born approximation calculations. However, for such a simplified model only modest qualitative agreements with experimental measurements was achieved. Moreover, only one chromosome in one nucleus was simulated, overlooking the effects of interactions between chromosomes. In this work, we adopt the helical plywood liquid crystal model with a capsule shape, in which parallel fibrils lie in plains perpendicular to the helix axis and the orientations of these fibrils twist at a constant angle between two neighboring layers. The ADDA code is applied to calculate the 16 Mueller matrices of light scattering from a single chromosome and from the nucleus, which is composed of a collection of randomly positioned and randomly orientated chromosomes. Special attention is paid to the S_{14} Mueller matrix element, which describes the ability of differentiating left circularly polarized and right circularly polarized light. Our results show that large S_{14} back scattering signals from the dinoflagellate nucleus results from the underlying helical structures of its chromosomes. These signals are sensitive to light wavelength and the pitch of the chromatic helix, the latter of which is species specific. Therefore, detecting back scattering S_{14} signal could be a promising method to monitor dinoflagellates such as *K. brevis*, the causal agent of the Florida red tide.

377 **Physics**

Energy harvest and collection from automobile traffic using active road rumbles

Robert Rorabaugh*, Abhishek Chatterjee, Christopher Venegas, and M. Salim Azzouz

With up to 1 billion cars on the road today losing five percent of their energy through breaking, vehicles traveling through roads and highways represent a huge source of wasted energy. In an effort to save energy it is possible to harvest some of this lost energy through a device built into the road. This presentation focuses on designing a mechanical system that collects the energy of cars passing over a depressible flapping road rumble panel. As the car passes over the flap, the panel depresses and turns a unidirectional shaft. The energy of many panels is collected and is summed up in a continuously turning flywheel. The collected mechanical energy can then be converted into electrical energy. The panels would be located where car drivers would apply the brakes in order to stop or slow down. The analysis of this active road rumbles concept will be 1) designing a prototype using a computer drawing software such as SolidWorks to determine stresses on the model, 2) modeling the system mathematically to figure out all the important and intervening parameters factoring in the expression of the energy efficiency of such systems, and 3) building a physical prototype to analyze the performances of such systems to determine the energy produced. The goal of building such an apparatus is to use the energy harvested from the transportation vehicles to empty an offshore sea silo tank and producing peak electrical energy by allowing seawater back into the silo through a hydraulic turbine.

P379 **Physics**

Proposal for a random Raman laser

Brett H. Hokr*, Vladislav V. Yakovlev, Georgi I. Petrov, Texas A&M University, College Station, TX and Benjamin Rockwell, Hope Beier, Air Force Research Labs, Ft. Sam Houston, TX and Gary Noojin, TASC Inc., San Antonio, TX and Leonid A. Golovan, Lomonosov Moscow State Univeristy, Moscow

A traditional laser uses an optical cavity to provide coherent feedback into the gain medium, allowing for the saturation of gain. Random lasers work in much the same way, except they use elastic scattering to provide incoherent feedback. We propose that the same can be achieved using inelastic Raman scattering to create a random Raman laser. We will present preliminary experimental results that show stimulated Raman scattering is present, which is of course the first ingredient needed for random Raman lasing. We have also developed a Monte Carlo type model for stimulated Raman scattering which suggests that shorter photon mean free paths lead to a kind of inelastic slow light effect when the pulse enters the random medium. This is because the diffusive speed of the light through the random medium is much slower than the speed of light in the vacuum, causing the pulse to bunch up at the front of the sample, creating a region that appears promising for random Raman lasing.

402 **Physics**

Dependence of levitation force on frequency of an oscillating magnetic levitation field in a bulk YBCO superconductor

Hamilton Carter Texas A&M University

The dependence of the magnetic field strength required for levitation of a melt textured, single domain YBCO superconductor disc on the frequency of the current generating the levitating magnetic field has been investigated. The magnetic field strength is found to be independent of frequency between 10 and 300 Hz. This required field strength is found to be in good experimental and theoretical agreement with the field strength required to levitate the same superconductor with a non-oscillating magnetic field. Hysteretic losses within the superconductor predicted by Bean's critical-state model were also calculated. The measured data rules out any significant Bean's model effects on the required levitation field strength within the measured frequency range.

P419 **Physics**

Effects of noise on phase transition

Eurydice Kanimba*, Michael NkainmbiBello, and Raul Hazel, Midwestern State University, Wichita Falls, TX.

Noise is usually thought as a phenomenon which introduces disorder. There are, however, some situations in which it participates in the creation of phase transition through its interaction with nonlinearities of the system. The purpose of this research was to demonstrate how noise can induce phase transition in nonlinear dynamical systems. Throughout our research, we came across chaos which is the unpredictable behavior of a system governed by deterministic laws. Due to the strong noise applied to the initial condition we obtained a total different strange attractor. Our approach was based on numerical method using the Fortran 90 programming language and graphically using Matlab. Our investigation brought us to understand how noise can shift the dynamical system from one limit set to another, essentially transition from one phase to another. The results graphed using Matlab were employed to illustrate the key points.

P424 **Physics**

Measurments of the interplay between the Néel and Brown Superspin Relaxation Times in Fe_3O_4/Hexane Magnetic Fluids

Joshua L. Morris*, Michael Eastman, Cristian E. Botez

Using frequency resolved AC-susceptibility we have measured the overall superspin dynamics of the 30 nm Fe_3O_4/hexane magnetic fluid system. We separated the contributions of the Néel and Brown relaxation mechanisms in the 200 and 300 K temperature range and determined the individual Néel and Brown relaxation times. Upon heating, we find that the Brown relaxation time (τ_B) undergoes a rapid decrease as opposed to its Néel counterpart. Analysis of our data yields $\tau_B = 1 \times 10^{-3}$ s at T = 237 K and $\tau_B = 1.5 \times 10^{-5}$ s at T =270 K, which indicates that the Brown relaxation mechanism is the dominant contributor to the system's overall relaxation time. This behavior stems from the heating induced reduction in the liquid carrier's viscosity.

P442 **Physics**

Pulse shaping filaments in a liquid

Jonathan Thompson*, Matt Springer, Andrew Traverso, Alexei Sokolov, Texas A&M University, College Station, TX, and Marlan Scully, Texas A&M University, College Station, TX, Princeton Unversity, Princeton, NJ, and Baylor University, Waco, TX

Femtosecond filaments are an interesting phenomenon that offer an immense number of possible applications. We study the effect of the temporal shape of femtosecond laser pulses on filamentation in a liquid. Similar studies have shown that some characteristics of filaments are closely related to the pulse shape. We shape femtosecond laser pulses using a 4f pulse shaper with a computer controlled liquid crystal spatial light modulator (SLM). With this SLM, we modulate the phase of the different frequencies of the laser pulse, thus gaining control of the temporal shape of the pulse. Using femtosecond laser pulses shaped by this pulse shaper, filaments are induced in liquid. We then study how the shape of our pulse affects the characteristics of filamentation.

443 **Physics**

Possible generation of coherent X and gamma radiation by collective parametric resonance

Xiwen Zhang and Anatoly Svidzinsky, Department of Physics and Astronomy, Texas A&M University, College Station, TX

Generating of X and gamma rays that have the properties of laser light has been a long-standing goal for experimental science. To generate such light one can use radiative nuclear transitions. Atomic nuclei in a crystal act like a cavity for high energy photons which are collectively absorbed and reemitted by the medium on a superradiant time scale determined by collective nuclear frequency which typically lies in the IR region. If such collective oscillations are periodically modulated in resonance this can yield exponential grow of the high frequency X or gamma radiation out of vacuum fluctuations. We show that the required modulation can be caused by coherent oscillation of nuclei near their equilibrium positions in the crystal which, in turn, can be produced by an IR laser beam incident at the crystal surface. We find that such parametric resonance mechanism can convert energy of the IR laser into coherent X or gamma radiation with high gain.

447 **Physics**

Lasing with no population in excited state produced by parametric excitation of collective atom-field oscillations

Anatoly Svidzinsky*, Luqi Yuan and Marlan Scully, Texas A&M University, College Station, TX

It is conventionally believed that lasing requires nonzero population in the excited level. We consider a medium composed of two level atoms. In such system a resonant photon is emitted and reabsorbed by the medium with collective frequency which is analogous to Langmuir oscillations in plasmas. We show that if atoms are coherently driven by a low frequency electromagnetic field then parametric resonance with the collective atomic oscillations can yield lasing at high energy atomic transition even if initially atoms are in the ground state. To achieve lasing one should suppress time-dependent Stark shift of atoms which can be realized in various schemes. We show that under this condition a weak laser pulse exponentially grows in the direction opposite to the propagation direction of the driving field. We demonstrate that using the effect of collective parametric resonance in gaseous medium one can make a device which converts IR laser beam into XUV coherent radiation.

457 **Physics**

Underwater imaging using Backward Monte Carlo Vector method

Dayou Chen*, George W. Kattawar

To calculate the 3D vector radiation field for the atmosphere-ocean system, a two-layer backward monte carlo vector code is developed. We send photons from the detector and propagate them towards the source in this model, which allows us to calculate the effective Mueller Matrix of the medium. This model can deal with dynamic interface, different boundary conditions and complex ocean environments. To model what a marine organism can see under the water, we first simulate a simple tank where several spheres of different sizes and different scattering properties are placed in it. The radiance and degree of polarization are imaged for different scattering types, and the relationship between image contrast and extinction coefficient is studied. To learn about the ocean water polarization information, we then simulate the polarizer images when polarizers are stuck on the surface of a piece of mirror and put in the open ocean. The radiance and degree of polarization are imaged with different incident light azimuthal angles and target depths. This simulation result is being compared with the measurements from Dr. Alex Gilerson.

474 **Physics**

Observation of the transition from superfluorescence to superradiance

Zhenhuan Yi*, Pankaj K. Jha, Luqi Yuan, Alexander Sinyukov, Dmitri V. Voronine, Ziyun Di, Vladmir A. Sautenkov, Alexei V. Sokolov, Texas A&M University, College Station, TX; Yuri V. Rostovtsev, University of North Texas, Denton, TX and Marlan O. Scully, Texas A&M University, College Station, TX, Baylor University, Waco, TX and Princeton University, Princeton, NJ

The atoms are pumped from the ground state $5^2S_{1/2}$ to $9^2S_{1/2}$ using two-photon excitation and a population inversion is introduced between energy levels $9^2S_{1/2}$ *and* $6^2P_{3/2}$. The population inversion triggers SF on this transition; if we then turn on a driving pulse which creates coherence between these two levels, then by increasing the energy of the drive pulses, hence the coherence, we can clearly see strong SR signal generated between $6^2P_{3/2}$ and $5^2S_{1/2}$. We also performed numerical simulations using parameters estimated from the experiment conditions. Recently, coherence brightened emission has been observed in atomic oxygen and theoretical work has been done to study the physics of this air-laser experiment. On the line of this theoretical work, we conducted an experimental investigation of the transition from Yoked superfluorescence (SF) to superradiance (SR) using ^{87}Rb as active medium.

499 **Physics**

Time-resolved surface-enhanced CARS spectroscopy

Dmitri V. Voronine*, Alexander M. Sinyukov, Xia Hua, Charles Ballmann, Alexei V. Sokolov, Texas A&M University, TX and Marlan O. Scully, Texas A&M, Princeton and Baylor Universities

Two most commonly used techniques that provide species-specific spectroscopic signals in the form of vibrational fingerprints are surface-enhanced Raman scattering (SERS) and coherent anti-Stokes Raman scattering (CARS) spectroscopies. In order to enhance the signal, SERS takes advantage of the electromagnetic near-field enhancement while CARS employs molecular coherence. We have combined these two techniques to achieve “best-of-both-worlds” maximum signal enhancement by using optimal laser pulse shaping and time-resolved detection. In contrast to previous femtosecond SECARS techniques, our approach employs femtosecond broadband pump and Stokes pulses to excite molecular vibrational coherence and a picosecond narrowband probe pulse to generate the signal. It is based on our previously developed FAST-CARS approach to suppress the nonresonant background. We applied this new time-resolved surface-enhanced coherent anti-Stokes Raman scattering (tr-SECARS) technique to investigate nanoscale molecular complexes of various molecules in a vicinity of gold nanoparticles.

P501 **Physics**

Interference of signal and background in surface-enhanced CARS spectroscopy

Charles W. Ballmann*[1], Dmitri V. Voronine[1,2], Alexander M. Sinyukov[1], Xia Hua[1], Alexei V. Sokolov[1], and Marlan O. Scully[1,2,3] (1)Texas A&M University, College Station, TX 77843 (2)Princeton University, Princeton, NJ 08544 (3)Baylor University, Waco, TX 76798

>We simulate interference between the surface-enhanced coherent anti-stokes Raman scattering (SECARS) signal and the non-resonant four-wave mixing background for various plasmonic nanostructures made of metal nanospheres. The nanostructures induce a phase shift in the near-field response depending on the incident light and plasmonic resonance. This phase shift may play a key role in the transformation of peaks to dips which was observed in SECARS experiments on random aggregated gold nanoparticles. Laser beams incident on a sample containing Raman-active molecules and gold nanoparticles on the surface of glass are scanned across different spots on the sample. In this process, peaks are changed into dips.

512 **Physics**

Searching for physics beyond the standard model with dilepton mass distributions at the LHC

Sean Wu Texas A&M University

Although the standard model has enjoyed a great deal of success over the past 30 years, it fails to account for the velocity distribution of galactic rotations. Supersymmetry (SUSY) offers a favorable model to solve this problem as the lightest SUSY particle (LSP) offers a stable dark matter candidate. The next step is to construct SUSY decay chains in the laboratory. The LHC offers the prime location to test such theories. By constructing the mass distribution of correlated dilepton events with large missing energy, the mass of the LSP can be calculated.

514 **Physics**

Searching for top squarks at the Large Hadron Collider in fully hadronic final state

Bhaskar Dutta, Teruki Kamon, Kuver Sinha, Kechen Wang*, Texas A&M University, College Station, TX and Nikolay Kolev, University of Regina, SK, Canada

In supersymmetry (SUSY) models, the lighter top squark (stop) mass can be much smaller than other squarks. It may very well happen that all other squarks and gluinos are quite heavy for the Large Hadron Collider (LHC) to probe in the near future while the lighter stop mass can still be accessible. In these stop models each stop predominantly decays into a top quark and a lightest neutralino, which is stable. We use an M_3 technique twice on the bjj system to reconstruct two top quarks which are pair-produced from the stops, in the fully hadronic channel. The dominant Standard Model (SM) background for this signal stems from $t\bar t$ plus jets process with one top quark decays into $ bl\nu$, where the lepton is undetected and the ν produces missing transverse momentum. The lepton identification efficiency is found to be crucial in order to estimate the background correctly. We studied events with at least 4 non-b jets, at least two b jets and large missing energy. The missing energy in the SM $t\bar t$ events is originated from the leptonic decay of the top quark, whereas the missing energy in the signal is from the lightest neutralinos in the stop decays. We utilize the kinematic correlations between jets and b-jets in the bjj systems and missing energy to improve the reconstruction of the pair of top quarks further. We find that at 8 TeV it is possible to produce background and signal cross-section at similar levels for stop masses around 350 - 500 GeV.

P531 **Physics**

Improving photovoltaic cell power utilizing quantum coherence

Marlan Scully, Texas A&M University, Princeton University, Baylor University, Anatoly Svidzinsky, Texas A&M University, Justin Highland*, Physics Department, Texas A&M University

As of 2012, the highest level of efficiency obtained by a Photovoltaic cell is 44 percent. The record efficiency was accomplished by using multi-junction solar cells that contain multiple bandgaps tuned to a specific wavelength of light. This ability to sample a larger portion of the available spectrum allows the cells to be more efficient. However, there is another mechanism by which greater power can be obtained. Detailed balance is the process by which the populations in two specific states are maintained. What this means for solar cells is that a photon is just as likely to be absorbed and cause the transition of an electron to the conducting band as it is to be reemitted. If the photon is reemitted, it does not contribute to the cell current. It has been shown that detailed balance in lasers can be subverted by way of quantum coherence effects, which yields lasing without inversion. If detailed balance is broken in the case of photovoltaic cells, a photon can become less likely to be absorbed and reemitted, which makes more electrons generate useful power. Here we present theoretical work showing that quantum coherence can be generated in photovoltaic cells by the photocurrent utilizing fano-interference. Which means that no additional power is need to complete this process. This, in turn, can increase the cell power.

P550 **Physics**

Magnetic properties of a long, thin-walled ferromagnetic nanotube

Chen Sun*, Valery Pokrovsky, Texas A&M University, College Station, TX

We consider magnetic properties of a long, thin-walled ferromagnetic nanotube. We include two contributions to the total energy: the exchange energy and the dipole-dipole energy (and also the Zeeman energy when an external field is applied). The possible stable states are the uniform magnetization state and the circulating magnetization state. For a given material, which of them has lower energy depends on the the dimensions of the tube. A tube with a domain wall(DW) in the middle is always not energy favorable, but there can exist half DW structures at the ends. We also consider the switching behavior when an external magnetic field is applied. Finally, the magnetic field produced by such a nanotube in different states is calculated.

310 **Science Education**

Crop & Animal Research Experience (CARE) for undergraduates at Texas A&M University: an example of a successful Research Experience for Undergraduates (REU) in the Biological Sciences

Craig Wilson, Ph.D., USDA/Hispanic Serving Institutions National Program (HSINP) & Texas A&M University, College Station

Faculty that has an interest in setting up their own Research Experience for Undergraduates (REU) and students seeking an internship at a USDA/ARS Research Laboratory will learn about a successful research internship opportunity. Attendees will be provided copies of the resultant research paper; be walked through the process of establishing an REU; be provided links and contacts to access USDA/ARS resources and scientists; be provided examples of previous student research projects and two student co-authored papers that resulted. This REU program was housed at the USDA/Agricultural Research Service/Southern Plains Agricultural Research Center (ARS/SPARC) at College Station, Texas where undergraduates in the Biological Sciences were engaged in cutting edge Agricultural Science research. Research scientists, each mentored an undergraduate student in a project specifically designed for them. Once the students had an understanding of the research area and had shown proficiency with techniques, they were encouraged to continue with their projects in a more independent manner but with ongoing mentoring during the summer session. SPARC is a world class facility that houses four research units with a combined mission to improve the productivity of important southern crops and to enhance the safety to the consumer of meat products derived from livestock and poultry. The students learned the value of research. All too often undergraduates pursue a science degree with no idea of how it might be applied in the real world to help them enter the career pipeline. The USDA/ARS is one Federal Agency that has over 100 research laboratories nationwide with a vested interest in developing and attracting home grown scientists.

P328 **Science Education**

TxKORP outreach: K-16 student engagement in geosciences

Kevin W. Stafford, Melinda G. Shaw, Wesley A. Brown, Department of Geology, Stephen F. Austin State University, Nacogdoches, TX

The Texas Karst Outreach and Research Program (TxKORP) at Stephen F. Austin State University (SFASU) was founded in fall 2011 to promote cave / karst research and education in the greater Texas region. TxKORP is dedicated to furthering best-management practices for natural resource sustainability, including both environmental and economic characterization associated with karst and pseudokarst terrains. During the first year of activity, TxKORP developed three separate K-16 geoscience outreach programs: 1) SFA Geo-Days; 2) SFA Hydrodays; 3) SFA Cave Camp. These activity-based programs focus on water and mineral resources of the greater Texas region to stimulate student interest in STEM (Science, Technology, Engineering and Mathematics) fields in regions where physical science is underappreciated. SFA Geo-Days and Hydrodays are specifically designed for middle school instruction as one-day short courses that spark interest in natural sciences and hopefully stimulate the next generation of Texas scientists. SFA Geo-Days focuses specifically on sedimentology and energy resources with an emphasis on deposition and diagenesis, including petroleum reservoirs in cavernous porosity. SFA Hydrodays emphasizes water resources and coupling of surface and groundwater systems as it contrasts between karsted and non-karsted terrains. SFA Cave Camp is offered to freshmen entering SFASU and includes a week-long field experience where students characterize hydrology, geology, geochemistry and ecology of Central Texas at Colorado Bend State Park. SFA Cave Camp is specifically designed to highlight the multidisciplinary nature of STEM fields through hands on applications as students begin their college career.

354 **Science Education**

Survivor, Sixteen, and the Nine-Card trick

Dr. Stefan T. Mecay, Schreiner University, Kerrville, TX

Inspired by the hit TV show Survivor, I started incorporating Survivor games into all my undergraduate classes. I use the last 5-10 minutes of class time to have my students compete against one another using mathematical games as challenges. One of the most popular challenges is a simple yet very addicting card game called Sixteen. I will teach the audience how to play Sixteen, and also as a bonus I will show them how to do the Nine-Card Trick, a mathematical card trick in which members of the audience get to perform the trick using their own mini-decks.

546 **Science Education**

Teaching with intent

Paula Noe, Austin ISD

"Teaching with Intent" is a professional development presentation that was written to reinforce fundamental concepts in science planning to increase student engagement, rigor, and success. The vertical alignment template that is the crux of the training is referred to as the " 9 box". Presenting the "9 box" in a teacher friendly way has been pivotal to our success as a district and instrumental to campuses that have a high teacher turnover rate. The basis of the "9 box" is what we call the instructional core- TEK, academic vocabulary, questioning, formative assessments, and anchors of support.

596 **Science Education**

Mapping the STAAR

Dr. Barbara ten Brink

Texas public schools have new state standards, Texas Essential Knowledge and Skills (TEKS) and new state testing standards, State of Texas Assessments of Academic Readiness (STAAR). In 2011, both of these standards were put to the test of all 5th and 8th grade science students. Using item analysis and STAAR answer keys, the author mapped TEKS tested, student performance for each test item, trends in each reporting category, performance on test items dual coded for scientific processes, and overal performance averages. These data provide implications for curriculum development, instructional delivery, goal setting, and budgetting for resources. Each year's STAAR data can be added in order to examine campus, district, and State improvements and weaknesses.

601 **Science Education**

Developing and conducting a hands-on assessment of biology lab skills and safety

Cathleen N. Early*, Karen Grant, Gregory D. Frederick, Arch Koontz, Andrew W. Woodward, and Kathleen Wood, University of Mary Hardin-Baylor, Belton, TX.

While standardized, multiple-choice exams, such as the Major Field Achievement Test in Biology, are commonly used in the assessment of field-specific concepts; commercial products designed to assess basic laboratory skills are not readily available. Faced with the need to evaluate the competency of our biology majors in various laboratory skills and safety procedures, the faculty of the Department of Biology at UMHB developed a unique Lab Safety and Skills Practical (LSSP). This talk will focus on the process of developing the questions, station setups and scoring guides for the skills evaluated and on the process of how the practical is conducted in order to provide a standard experience for each student. We have administered the LSSP every semester since May 2011; some outcomes and resulting curriculum changes will also be presented.

606 **Science Education**

The new college algebra and how I teach it

Dr. John T. Sieben, Texas Lutheran University

Traditional College Algebra courses were designed decades ago as the entry course for STEM students who would follow on with courses in the calculus sequence. But studies show that today as few as 10% of college algebra students enroll in a calculus course. An MAA report, "Voices of the Partner Disciplines" suggest how we can better prepare the 90% of college algebra students who will not major in a STEM discipline. This presentation will examine the conclusions of several studies and look at an alternate first course for non STEM students. In conclusion the "inverted classroom" will be defined and a case made for its use.

616 **Science Education**

Safety in Texas secondary science classrooms: 1990-2007

Lisa Kennedy and Sandra West, Texas State University, San Marcos, TX.

This longitudinal study of science classrooms in Texas represents not only one of the few studies on safety in secondary settings, but the only longitudinal study with random, representative and stratified samples. Beginning in 1990 with a focus on chemistry classrooms, the culminating 2007 survey of 529 science teachers revealed inadequacies with safety implications. Overcrowding overwhelmingly concerns science teachers. Fewer than 50% received safety training in the prior 12 months. No statewide system is in place to collect data on secondary school science accidents and thus little information upon which to base policy, rules, regulation or legislation. Lastly, science teachers are unaware of the importance of safety in science classroom as it relates to the possibility of serious, even deadly accidents that can and have occurred in science classrooms.

617 **Science Education**

Chinese precollege education: a student’s perspective

Yutian Yu

Chinese K-12 education is very different from U.S. schools. The school days are longer. The elementary day finished about 4-5pm. Middle school day lasted from 7 am – 6pm and high school students went to class from 7am to 10pm. Class sizes were large – about 60 students. Students are tracked by ability. The top 40 students were together in one class. Students remained in one room all day and the teachers rotated in. In high school students were tracked into either science or liberal arts. Students primarily listened to lectures and did homework; few projects or little group work. No hands-on instruction was used and thus required the use of imagination to learn about or understand abstract ideas. Holidays decreased as students advanced grade levels. High school students had only one week for the Chinese new-year holidays and Sunday afternoons.

618 **Science Education**

STEM education: efficacy of integrating science and math

Sandra West, Texas State University, San Marcos, TX, and Sandra Browning, University of Houston at Clear Lake, Houston, TX.

STEM refers to science, technology, engineering and math. However, there is no definition of STEM. Does it simply mean more focus on and resources for the disciplines separately? Does it mean linking them through engineering or through technology? Does it mean integrating all four of them together or ????? Our research indicates there is efficacy in the simple and perhaps fundamental integration of science and math, at least initially in a STEM program. Surprisingly, science and math are not as alike as many of us thought initially. Yes, there are many similarities between science and math as opposed to the liberal or fine arts. And, yes there is a link among all disciplines that humans have artificially divided. However, there are fundamental differences in pedagogy and language between science and math and that is one reason that simply trying to integrate science and math for K-12 students may be a more efficient initial approach to comprehensive STEM education. Results from a five year study on the efficacy indicates the Correlated Science and Math PD model can have a positive impact on teachers' practice and student performance.

619 **Science Education**

Case study of math teacher's pathway to conceptual teaching

Sandra Browning, University of Houston at Clear Lake, Houston, TX, Sandra West, Texas State University, San Marcos, TX, and Laura Schlichting, North East ISD, San Antonio, TX.

This exemplary middle school math teacher had students who scored well on standardized state and district math tests. Her students loved coming to class and learning math. They could solve every math problem in book, but when put into a real world context they were utterly lost. The teacher realized this gap in their understanding of math when helping students work speed problems from their science class. Students could work ratios problems in math, but not when working speed ratios problems. The teacher realized there were two impacting factors: lack of depth of understanding in math to apply their math skill in a real world context and lack of ability to use "ugly numbers" found in science and the real world. Most numbers found in the real works don't' come as whole numbers or decimal number to the 100 th place which is different from math problems. While it may be correct math pedagogy to use "pretty" numbers in initially teaching a math concept, students who have not had to wrestle with "ugly" numbers to develop the depth of understanding to apply that math skill in a different context become confused when challenged to use that skill in the real world of science. The teacher didn't realize she was doing them a disservice by not going beyond the textbook or commercial curricula's contrived math problems that did not truly challenge students to problem solve. The teacher is now writing long word problems with "ugly" numbers where students have to actually think.

620 **Science Education**

International Astronomical Search Collaboration: Original Discoveries of Main Belt Asteroids by High School & College Students

Patrick Miller Hardin-Simmons University, Denise Rothrock Madisonville High School

60 min worksop - 30 minutes will be spent on a description of the International Astronomical Search Collaboration (IASC = "Isaac), an online education program in astronomical discovery centered at Hardin-Simmons University (Abilene, TX). High school and college students download image sets taken the night before at professional observatories then analyze them with the program Astrometrica, looking for original discoveries of Main Belt asteroids.

30 minutes will be spent showing the attending students and teachers how to use Astrometrica to make these discoveries. New, never-before-analyzed image sets will be provided and the workshop participants will search for discoveries. No guarantees, but discoveries have been made in these IASC workshops in the past. One discovery was a near-Earth asteroid that was the size of 3 football fields and potentially hazardous, posing an impact risk with Earth.onal observatories then analyze them with the program.

621 **Science Education**

Teaching Environmental Science in the Three Rivers' Air & Watersheds

James Westgate, Lamar University

The Teaching Environmental Science (TES) field-based, graduate-level summer Institute, now in its 18th year, annually introduces up to 20 Texas' EC-12 teachers to environmental issues, problems and solutions through first-hand experiences. The Institute is a partnership with the Texas Regional Science Collaborative Program, and is co-mentored by the Department of Earth & Space Sciences (Lamar University) and local industry, government and environmental NGO organizations. Environmental topics deal with industrial, agricultural and domestic wastes and emissions which affect the Neches, Trinity and Sabine River watersheds and air-sheds. Ten full-days of field trips target selected environmental topics. Field activities prepare teachers to instruct on environmental issues through self-directed, inquiry-method learning. Teachers write environmental science curricula in subsequent weeks, which are then shared among the cohort. Industrial field trips visit refineries, petrochemical, electrical generation, and paper-making sites with the focus on industry efforts to lessen its impact on the local environment. Canoe, airboat and research vessel trips in cypress swamps, salt marshes, and the open Trinity Bay estuary give teachers information bases on coastal ecosystems and local endangered species' habitats. Visits to the Shangri La Botanical Gardens and Nature Center, a Coastal Fisheries Lab and a TCEQ Continuous Air Monitoring (CAM) Station provide new strategies for

teaching the importance of environmental issues. The TES Institute is unique in having financial support from industry, government and non-profit agencies. Full graduate science tuition scholarships and teaching materials are provided for in-service teacher participants. Since its inception, more than 200,000 Texas students have taken courses from environmentally enlightened TES Institute teacher alumni.

622 **Science Education**

Ecology Field Academy for Secondary Science Teachers

Zane Laws, Cisco College, Abilene Education Center

The Ecology Field Academy was a three-day hands-on workshop for secondary science teachers. The teachers learned skills that are used in ecological research. They learned the skills in the classroom then performed them in the field using materials that are readily available to any teacher. The skills included sampling techniques, population density analysis, and specimen collection techniques. After performing the field work, the teachers discussed how these skills could be used in their classrooms, how they fit into the curriculum, and how they fit in the state standards.

623 **Science Education**

Improving teaching strategies in big classrooms. How do we get students actively involved in the learning process?

Manuela Gardner, Texas A&M – Corpus Christi

The presentation will describe and discuss challenges encountered when teaching big classes (over 150 students). Different goals within the classroom will also be described For example: What information and concepts should the students learn? How should they be able to apply this information? The final part of the presentation will focus on possible teaching strategies that can be applied to big classrooms and that will improve student learning outcomes.

624 **Science Education**

Natural Resources and Environmental Literacy Plan for Texas: Strategies on getting the hearts and minds of the next generation informed on land, water, climate and ecosystems.

Thomas L. Arsuffi, Texas Tech University; Christine Mosely, University Texas at San Antonio; Nancy Herron, Texas Parks and Wildlife Department

This symposium will highlight the new Texas Natural Resources and Environmental Literacy Plan for Texas: Strategies on getting the hearts and minds of the next generation informed on land, water, climate and ecosystems, as well as the diverse and critical role of diverse environmental education programs across Texas and across agencies, universities, schools and informal and formal science centers in improving ecological literacy, natural resource education, science and teacher training and integration of education and research across a number of major research and educational initiatives in Texas. The symposium organizers will bring in leading educators, scientists and experts from K-12 schools, universities, state agencies and informal science venues. The following goals of the plan form the template for the symposium presentations.
Goal I: Lifelong Learning and Community Connections
The Plan will support a network of community connections to provide opportunities through resources, programs, and places for all individuals, groups, and organizations in Texas in order to develop a culture of appreciation and life-long learning in environmental literacy.
Goal II: Formal Education
The Plan will provide a framework to ensure specific knowledge, skills and graduation requirements, incorporate environmental literacy into teaching practices, the use of learning environments in schools, and student outcomes.
Goal III: Informal Education
The Plan will provide a framework to support specific knowledge and skills and outcomes of environmental literacy through teaching practices and learning environments in informal educational settings.
Goal IV: Professional Development
The plan will support programs, partnerships and resources for all stakeholders in natural resource and environmental literacy to improve environmental content knowledge and skills in teaching about environmental issues (both indoors and field based).
Goal V: Assessment of Environmental Literacy
The Plan will develop systems for the evaluation of the overall Natural Resources/Environmental Literacy Plan; including assessment of effective strategies and programs for ongoing improvement.
Goal VI: Funding and Support
The Plan will ensure that the partners in this initiative have the necessary funding and support to implement the elements of the Texas Environmental Literacy Plan.

316 **Systematics and Evolutionary Biology**

Female fitness as a function of stored sperm in the livebearing western mosquitofish, *Gambusia affinis*

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Females in promiscuous mating systems can use sperm storage as a mechanism of post-copulatory sexual selection to preferentially choose sperm and to give birth to multiple broods before mating again. The interbrood interval, IBI, (the time period between two different broods) suggests the length of time a female can store sperm, quality of sperm, and number of offspring produced per brood. *Gambusia affinis*, an invasive live bearing fish, was studied due to its ability to store sperm, the natural abundance of the species and the ease at which it can be studied in the laboratory. We examined IBI and paternity of offspring resulting from stored sperm of female *G. affinis*. We predict for females relying solely on stored sperm that 1) brood number and number of neonates are inversely related; 2) IBI will remain constant and 3) number of fathers per brood will decrease. For females mated with males, we predict 1) brood number will increase due to presence of males; 2) number of offspring should remain constant; and 3) number of fathers per brood will increase as a function of number of males

present. We investigated 10 females from each treatment (0,1, 2, or 3 males) over the breeding season (March to November). IBI was significantly different across and within treatments while mean number of neonates showed no statistical difference due to high levels of variation. Results from PCR paternity tests and mean offspring weight will be analyzed.

P365 **Systematics and Evolutionary Biology**

Linking function and behavior in a coercive livebearing fish (*Gambusia affinis*)

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Male *Gambusia affinis* exhibit courting behaviors to obtain mates, such as the gonopodial display in which males can lower a modified anal 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). These distinct behaviors suggest a possible difference in function. We hypothesize that the 90° gonopodial display in male mosquitofish functions in both male-male competition and in courtship, while the 180° display functions primarily in courtship. We used an open water design to observe and quantify behaviors of each focal male for 10 minutes in the following treatments: one male and one female, two males with no female, and two males with one female to introduce male competition with 20 replicates per experiment. The frequency of 90° displays by males predicted the number of copulation attempts, and female size predicted the frequency of 180° displays by males, supporting that this behavior plays a role in courtship and mating (e.g. sperm priming). However, when no female was present, there was no difference in male display behaviors, suggesting that the presence of females drives both behaviors. Overall, results suggest that males use 90° and 180° display behaviors for both courtship and aggressive displays. Future studies will test whether the 180° display behavior functions primarily as a sperm priming mechanism.

P366 **Systematics and Evolutionary Biology**

Post-parturition females cannibalize at higher rates but do not discriminate against their own young.

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Cannibalism can influence population structure, mating behavior, resources, and other behaviors, and according to Hamilton's kinship theory, cannibalistic behavior should be directed toward non-kin. However, filial cannibalism (eating own offspring) goes against this theory, and filial cannibalism as an adaptive behavior has been questioned. Cannibalistic behavior has been observed in various species of the family Poeciliidae, including mosquitofishes. However, to our knowledge no studies have been conducted to address selective cannibalism with respect to relatedness (i.e. kin selection) in livebearers . First, we were interested in whether female reproductive state influences the rate of cannibalism. We tested rate of cannibalism in early gravid, late gravid, and post-parturition and found that post-parturition females cannibalized at higher rates. Therefore, for subsequent experiments, we used post-parturition females to test the hypothesis that females can discriminate against cannibalizing their own young. We predicted that females will cannibalize another female's offspring at higher rates than her own. However, females did not discriminate against their own young (data repeatable across two studies), cannibalizing their own and another female's offspring at the same rate. In our third experiment, we tested rate of cannibalism in two species of livebearing fishes (guppies and western mosquitofish). While mosquitofish cannibalized at significantly higher rates, neither species discriminated against cannibalizing their own young. Our data do not support the hypothesis that cannibalism should be directed away from kin; thus there likely are other explanations for this behavior (e.g. re-sequestering of nutrients), especially for mosquitofishes where cannibalism is high.

374 **Systematics and Evolutionary Biology**

Spatial and temporal shifts in Paleogene crocodyliform diversity and a new globidont alligatoroid from the Middle Eocene of West Texas

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Most information regarding the loss of diversity within Crocodyliformes in the Middle-Late Eocene comes from specimens from the central Western Interior. However, crocodyliforms from the Middle Eocene Devil's Graveyard Formation (DGF) of West Texas provide additional, southern data during that period of faunal reorganization. Here we describe a new alligatoroid from the middle member of the DGF (Late Uintan-Duchesnean) based on the most complete alligatoroid material known from Tertiary deposits outside of the Western Interior. The new taxon is similar to alligatorines from the Uinta Formation of Utah and shares the presence of nearly spherical tooth crowns with previously published mandibular fragments from lower units in the DGF. The new DGF taxon is distinguished from all other alligatorines on the basis of several caiman-like features, including prominent, notched, descending laminae of the pterygoids posterior to the choana and long, descending processes of the exoccipitals in contact with the basioccipital tubera. Autapomorphies include rounded anterior processes of the palatines and a prominent, anteriorly extending crest on the dorsal surface of the skull anterior to the orbit. Although the posterior maxillary teeth are bulbous, those alveoli are smaller than the fourth and fifth maxillary alveoli, which is a feature shared with *Alligator* and another new, unnamed species from the Uinta Formation. Our phylogenetic analysis indicates potential affinities of the new DGF taxon with Alligatorinae. This new taxon adds to the diversity of globidontans in the Paleogene and represents the southernmost known occurrence of a blunt-toothed alligatoroid in the Paleogene of North America.

375 **Systematics and Evolutionary Biology**

Evaluating the evolution of plastral kinesis in Testudinoid turtles

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Three genera, *Emys*, *Emydoidea*, and *Terrapene* are extant and have plastral kinesis within the Emydidae. Understanding variation is critical to understanding diversity in the past and present and allows us to identify fossils with greater confidence. Studies have recently been completed evaluating intraspecific and interspecific variation between two species of *Terrapene.* Here, I provide a look at the *Emys* complex, which traditionally included only a single species, but now has two species recognized. Seventeen specimens of the two species of *Emys* were scored for discrete skeletal variation. Characters studied are often used to identify and diagnose fossil specimens of turtles. Variation was present in the number of neurals present, neural configuration, the location of the humero-pectoral sulcus on the plastron, and in co-ossification of shell bones. The proportion of polymorphic characters in this dataset is 32.3%. *Emys* appears to have less intraspecific variation than extant species of *Terrapene.* While the degree of variation is lower in the *Emys* complex than the *Terrapene* complex, there may still be difficulty in identifying fossils that may belong to or be closely related to the *Emys* complex. This study has allowed for the identification of sets of characters that can be further explored for developing more robust fossil identifications. It also illustrates that the degree of variability differs by taxon within the Emydidae and particularly among taxa with plastral kinesis, the ramifications of this differential variability are still unclear.

376 **Systematics and Evolutionary Biology**

The ants of Texas

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Ants, which are found on every content except for Antarctica, are a predominate part of terrestrial ecosystems. Their abundance and diversity makes them an exceptional candidate for ecology work on any scale. The North America myrmecofauna has received a great deal of taxonomic attention, much of the early ant material came out of Texas and a good number of North American species where originally described from this material. Texas has representatives from all 10 subfamilies of Formicidae with nearly 300 documented species, many of which are known only from the state. Despite its role in the initial taxonomic work on ants within North America, Texas has never received the detailed study it deserves. The Ants of Texas project is designed to not only study the ant fauna in terms of diversity and distribution, but also in respects to many ecological questions.

393 **Systematics and Evolutionary Biology**

The utility of the zonadhesin protein as a potential isolating mechanism in three pairs of rodent species

Emma K. Roberts*, Robert D. Bradley, Texas Tech University, Lubbock, TX and Daniel M. Hardy, Texas Tech University Health Sciences Center, Lubbock, TX.

Zonadhesin (*Zan*) is a multi-domain, transmembrane, species specific sperm protein that is crucial in the binding interaction of the spermatozoa and the zona pellucida of the egg during fertilization. The structurally unique domains of this protein, especially the additional domain in rodents, suggest the function is sperm adhesion to the egg's outer layer due to complementary change. *Zan* is a molecule that has undergone domain expansion and positive selection in mammals. Consequently, the protein may play an important role in protecting species gene pools by preventing or reducing the production of hybrid offspring. Sequencing the protein from three pairs of rodent species (*Geomys bursarius* and *G. knoxjonesi*, *Neotoma micropus* and *N. floridana*, and *Spermophilus mexicanus* and *S. tridecemlineatus*) known to produce hybrids with varying levels of success and performing a comparative study will determine if this protein acts as an isolation mechanism in these species. By sequencing the *Zan* protein in both the parental types, as well as hybrid individuals, we can determine if this protein sequence is conserved, at what level of conservation, and if *Zan* might be a possible isolating mechanism for these species.

396 **Systematics and Evolutionary Biology**

Karyotype of *Peromyscus grandis* (Rodentia: Cricetidae) and comments concerning its phylogenetic affinity

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Peromyscus grandis (large deer mouse) is an endemic rodent whose distribution is restricted to the montane regions of central Guatemala. Historically, this species has been assigned to the *Peromyscus mexicanus* group based on analyses of morphological characters, however relationships to other geographically proximal species of *Peromyscus* have been proposed. Herein, karyotypic data are presented from three females collected at the Chelemhá Reserve (Alta Verapaz, Guatemala). The karyotype of *P. grandis* depicts a diploid number of 48 and includes 2 large, 1 medium, and 3 small pairs of biarmed chromosomes, generating a fundamental number of 56. This karyotype is compared to other members of the *P. mexicanus* species group and the taxonomic status of *P. grandis* is discussed. Additionally, the phylogenetic affinity of *P. grandis* and other members of the *P. mexicanus* species group were examined using sequences of the mitochondrial cytochrome-b gene.

P400 **Systematics and Evolutionary Biology**

Molecular systematics of the Ophiurodea using 16S rDNA

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Ophiuroids are the most speciose of echinoderms, yet compared to other echinoderm classes, little is known about this group. In particular, information is scarce in the scientific literature regarding ophiuroid systematics, especially at higher taxon levels. Currently, only a single study exists evaluating family-subfamily relationships of the Ophiuroidea in a phylogenetic framework. In this study, molecular data was recovered for approximately half of the currently recognized families, and node support was weak for some relationships. A more recent study focused on molecular systematics within one of the two ophiuroid clades, the Euryalida. As such, we will focus primarily on family-subfamily relationships within the Ophiurida, the largest of the two clades. We plan to use mitochondrial and nuclear markers to reconstruct phylogenetic relationships of the majority of the 17 extant ophiuroid families, as well as several subfamilies. Preliminary data will be presented from the 16S rDNA mitochondrial gene from at least 11 ophiuroid families.

P416 **Systematics and Evolutionary Biology**

Maturation-dependent sperm storage in livebearing fishes

Charline Valerie Mejia*, Paula Raelynn Deaton, St.Edward's University, Austin, TX

Female livebearing fishes (family Poeciliidae) have the ability to store sperm for long periods. Sperm storage is most common in polyandrous organisms and likely evolved as an adaptation to preferentially choose sperm. These responses allow females to maintain control over paternal genetics and/or allow females to have offspring when males are unavailable. While it is known that immature females can mate with males, it is unknown whether juvenile females have sperm storage capabilities. Further, it is unknown at what point during development females begin to store sperm, which is assumed to be at sexual maturation. Recent studies, however, point to the possibility that immature females may also have this capability. Thus, I will use virgin female guppies (*Poecilia latipinna*) and western mosquitofish (*Gambusia affinis)* to test comparatively whether immature females can, in fact store sperm and for how long. Preliminary assessments of western mosquitofish show that females can mature sexually (with ovary) as early as 14mm in length, averaging 17mm, and begin to develop ripe eggs for fertilization by 16mm, averaging 20mm. From these data I have assigned 5 size classes for females (10mm – 22mm) to assess sperm storage capabilities. The same will be done for guppy females. Virgin females from both species across each size class will then be mated with males, isolated and monitored for pregnancy. If our hypothesis is supported, this study will provide the first evidence that immature fish have the ability to store sperm for later use, providing an important framework for subsequent studies.

425 **Systematics and Evolutionary Biology**

Comparative morphology of the pectoral girdle and forelimb of a phytosaur

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Phytosaurs are quadrupedal, semi-aquatic archosauriforms known from the Late Triassic. Complete skeletons are rare, and only a few taxa are known from more than cranial material. We examined the forelimb material of a newly-prepared specimen (TMM 31100-1332) from the Dockum Group in Texas that is similar to *Angistorhinus*. This specimen consists of a nearly-articulated, complete skeleton and is one of the most complete phytosaurs known from North America. The pectoral girdle and forelimb material that is prepared includes the right and left coracoids, the right and two left scapulae, the right humerus, both radii and ulnae, 1st-4th left metacarpals, 1st-3rd and 5th right metacarpals, six complete and five partial phalanges, and two distal phalanges. From this specimen, we developed eleven new morphologic phylogenetic characters based on the pectoral girdle and forelimb to test if the inclusion of postcrania affects the previously-recovered relationships within Phytosauria. The new characters consist of one from the coracoid, two from the scapula, four from the humerus, three from the ulna, and one from the radius. We incorporated the new characters in an already-existing matrix consisting of only skull characters. Out of the twenty-two phytosaurs in the analysis, only five consist of cranial and known forelimb material. Analysis of the forelimb characters indicated that the missing data from the other seventeen phytosaur taxa included does not have an effect on the topology. This might be because cranial morphology is reflecting actual systematic relationships; however, postcranial material should be considered for future systematic relevance.

434 **Systematics and Evolutionary Biology**

The earliest record of *Cordylus* from continental Africa

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Cordylus is represented by a charismatic clade of six extant armored lizards in Africa with an elusive fossil history. Although molecular analyses suggest the divergence of *Cordylus*from other Cordyliformes over 35 million years ago on continental Africa, no specimens of *Cordylus* are described from localities older than the Late Pleistocene in the published literature. Matjhabeng, a mid-Pliocene river deposit in South Africa, preserves the earliest record of *Cordylus* known and is described here for the first time. The Matjhabeng specimen is an isolated left maxilla and is identified as *Cordylus* based on several apomorphies. Cordyliform characters present include unequal extensions of the dorsal and ventral processes at posterior end of maxilla, only slight lacrimal and prefrontal emarginations, an apex of the facial process of the maxilla that is not posteriorly directed, a gentle slope down the posterior margin of the facial process, and an anterior overhang of the external naris. This specimen is distinguished from other Cordyliformes to the exclusion of *Cordylus* by an edge of the internal naris that is over half the total length of the maxilla and a diagnostic rectangular-shaped osteodermal impression that is parallel to the maxillary shelf. The description of this specimen makes this the oldest definitive record of *Cordylus*in the fossil record. These data further support the current historical biogeographical hypotheses of *Cordylus* originally based on molecular data, and promise to help elucidate the evolution of this enigmatic African clade.

P437 **Systematics and Evolutionary Biology**

Preliminary results of a total evidence approach to resolving *Peromyscus*

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Numerous studies have examined the subfamily Neotominae utilizing morphological, allozyme, or karyotypic data, as well as mitochondrial and nuclear DNA sequences. These studies have led to various taxonomic arrangements and numerous interpretations of relationships at the generic level. Most of the interpretations as to how many genera should be recognized within this group center around the definition of *Peromyscus.* Do relationships within *Peromyscus* follow a *sensu stricto* interpretation where morphologically divergent taxa are recognized as genera following Carleton (1980,1989) or a *sensu lato* interpretation in which *Peromyscus* contains multiple subgenera as proposed by Osgood (1909), Hooper (1968), Bradley et al. (2007), and Platt et al. (submitted)? Recent molecular data suggest that *Peromyscus* (*sensu stricto*) should be abandoned due to its paraphyletic nature and that the most logical solution would be to subsume all genera and subgenera formerly recognized within *Peromyscus* (*sensu lato*) excluding *Isthmomys*, to the species group level within a single genus (*Peromyscus*). This approach would account for phylogenetic clades obtained from genetic data, while continuing to recognize morphological variation thus requiring minimal changes relative to recognizing additional generea or subgenera (Platt et al.

submitted). In this study we reanalyzed Carleton's 1980 dataset with more recent phylogenetic methods and combined the morphological data with genetic data to determine if a total evidence approach would show better resolution for relationships within the Neotominae.

P440 **Systematics and Evolutionary Biology**

A new desmatosuchine aetosaur from Potter County, Texas

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Aetosaurs are a clade of quadrupedal, heavily-armored pseudosuchian archosaurs from the Late Triassic. Their dorsal armor consists of four anteroposteriorly-oriented columns of paramedian and lateral osteoderms. Because of their distinctive ornamentation and morphology, global distribution, and diversity, aetosaurs often are used for biostratigraphic and biochronologic correlations of the Late Triassic. Aetosaur osteoderms with elongated dorsal eminences on the lateral osteoderms often were identified as *Desmatosuchus*, and were used to correlate with the Otischalkian and Adamanian land vertebrate faunachrons. However, identifications of multiple specimens were revised recently in light of additional comparative specimens and a new evolutionary framework for examining the phylogenetic signal of aetosaur osteoderm morphology. Recent fieldwork in the Tecovas Formation of Potter County resulted in the collection of a new aetosaur specimen that consists of at least one cervical vertebra, anterior cervical lateral osteoderms with dorsoventrally-compressed and anteroposteriorly-elongated dorsal eminences, an elongated lateral osteoderm from the posterior portion of the cervical series, and several extremely thickened cervical and dorsal paramedian osteoderms with an ornamentation consisting of fine pits and furrows. This specimen shares the following characters with *Desmatosuchus*: presence of anterior laminae on paramedian and lateral osteoderms; tongue-and-groove articular surfaces on paramedian and lateral osteoderms; cervical paramedian osteoderms that are longer than wide; elongated dorsal eminences on the cervical lateral osteoderms; recurved cervical lateral 'horn' with no faceting. The new specimen adds to the known diversity of aetosaurs from the Tecovas Formation exposures in Potter County, which include *Sierritasuchus*, *Calyptosuchus wellesi*, and a specimen identified as *Paratypothorax*.

441 **Systematics and Evolutionary Biology**

Recombination without sex: Quantifying genome dynamics in an asexual lizard

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The paradox of sex presents a persistent puzzle to evolutionary biology: why does sexual reproduction predominate in animals despite the two-fold demographic advantage of asexual species? One accepted hypothesis states that sex generates novel combinations of genomic variants via recombination – this process underlies the central justification for the pervasiveness of sexual reproduction in animals and the ephemeral nature of asexual lineages. Without recombination, asexual populations accumulate deleterious mutations (Muller's Ratchet Hypothesis) and lack the genetic variation necessary for adaptation, ultimately leading to their extinction. But what if an asexual species experiences recombination? I will present three related studies investigating genome dynamics in the naturally occurring diploid parthenogenetic whiptail lizard, *Aspidoscelis tesselata*. As with most parthenogenetic amniotes, asexuality arose after hybridization between two related species. In this case, the asexual *A. tesselata* arose from hybridization between the sexual *A. marmorata* and *A. gularis*; thus, the genome of *A. tesselata* is perpetually hybrid. I will examine recombination dynamics between the genomic complements of this hybrid system that conventional thought would assume remain static (and do not exhibit recombination). Such dynamics may play an important role in producing diversity that we otherwise assume does not exist. These studies will elucidate mechanisms that may facilitate the persistence of asexuality.

P458 **Systematics and Evolutionary Biology**

Phylogentic relationships in the rodent genus *Thomasomys*

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Phylogenetic relationships in the genus *Thomasomys* were analyzed based on sequences for the mitochondrial cytochrome *b* gene (1183 base pairs). The primary objective of this study was to test previous taxon descriptions for species of *Thomasomys* to facilitate creation of an updated key for the mammals of Ecuador. New sequences were collected primarily from animals in Sangay National Park of Ecuador and combined with sequences from GenBank. New sequences were generated using the primers P484 and P485 and standard extraction, amplification and sequencing protocols. Sequences were edited and aligned manually. Maximum likelihood (ML) searches were performed with gaps treated as missing data and each codon position treated as a separate partition. In the ML reconstruction, nodes at the species level were well resolved, and most species of *Thomasomys* were shown to be monophyletic, with the exception of *T. baeops*. A subclade of *T. baeops* was grouped together with *T. ischyurus* (95% bootstrap), but all of the *T. baeops* specimens were otherwise grouped together (85% bootstrap). In contrast, most deep nodes joining multiple species into clades had bootstrap values lower than 70%. One exception was the grouping of *T. silvestris* and *T. caudivarious* (73% bootstrap). These species were collected from the eastern slope and western slope of the Andes respectively, suggesting allopatric speciation. Mitochondrial DNA has been found to contain more homoplasy than nuclear DNA. To address this deficiency, we are exploring the RAG1 gene to potentially obtain better resolution of the deeper nodes in order to test hypotheses of speciation.

465 **Systematics and Evolutionary Biology**

Developmental variation and variability in the ossification sequence of *Monodelphis domestica.*

Zachary Morris*, The University of Texas at Austin

Comparisons of ontogenies among a variety of taxa can provide insight into the evolution of skeletal development within particular clades. However, many of the current techniques for characterizing ontogenies do not recognize intraspecific developmental variation. Additionally, different analyses comprise data about the onset of ossification derived from cleared and stained specimens, histological sections, computed tomography scanning (CT) or some combination of the three. It has been noted anecdotally that histological sections may show the appearance of ossification earlier in absolute age than cleared and stained specimens, but comparisons to CT datasets have not been previously made. My analysis uses Ontogenetic Sequence Analysis to characterize levels of variation and variability during skeletal development in the marsupial *Monodelphis domestica* (75 specimens of known age spanning birth to Day 24) and assess whether

systematic biases exist among techniques used to assess ossification. Ten cleared and stained specimens were CT scanned allowing comparisons between techniques using the same individual specimens, so that individual variation was not a confounding variable. The onset of ossification was generally observable on the same day using all three methods; however, with CT and histological methods the onset of ossification was often apparent days earlier than with clearing and staining. Considerable sequence variation was recovered in the estimated ossification sequence when only one method was used, notably in the otic region of the skull and the carpals. This example demonstrates that proper consideration of both different specimen types and real ontogenetic variation are critical for comparative developmental analyses.

467 **Systematics and Evolutionary Biology**

Comparative effects of female resistance on male mating success across three livebearing fishes

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The purpose of this study was to determine if female livebearing fishes (Poeciliidae) use resistance as means controlling male mating success. Here we use a comparative approach to quantify female resistance across three species of livebearers that vary in their mating strategies (*Gambusia geiseri* and *Gambusia affinis,* and *Heterophallus milleri*). We tested the hypotheses that 1) female resistance affects male mating success (number of male copulations) and female resistance is a function of the primary mating tactic males employ during mating. For male mating success (copulation attempts), we predicted that copulation attempts in *G. affinis* and *G. geiseri* would increase when females could not resist males. We manipulated female resistance by sedating females in clove oil which reduces their ability to resist matings. We compared mating behaviors across female treatment (lucid vs. sedated) and among species. *Gambusia affinis* increased copulation attempts when females were sedated suggesting that *G. affinis* use forced copulations at higher rates in comparison to *G. geiseri* and *H. millleri.* Only *G. affinis* females used resistance to control male mating success. Future studies should focus on reasons why female resistance appears to be more important in *G. affinis* mating systems than the closely related *G. geiseri* and *H. milleri*. Males of all three species reduced their display behaviors when females were sedated which did not meet my predictions. These observed shifts in male display behaviors for *Gambusia* provide evidence for a larger role of female mate choice in coercive species than previously thought.

P469 **Systematics and Evolutionary Biology**

Estimation of the paleoniche of *Mentzelia thompsonii* (Loasaceae)

Jonathan Stites*, Emily Crain, Elizabeth V. Lurz, Joshua M. Brokaw, Abilene Christian University, Abilene, TX

Mentzelia thompsonii is a plant in *Mentzelia* section *Trachyphytum* occurring along the border of Colorado and Utah. Section *Trachyphytum* consists of annual ruderals that rely in part on animals to help translocate their sticky fruits. However, *M. thompsonii* occurs predominantly in unusual Mancos Shale soils. In order to better understand the relationship between dispersal and adaptation in *M. thompsonii*, we have combined genetic and paleoclimate data to reconstruct historical distribution patterns. In a previous study, we found that populations north and south of the Colorado River are genetically distinct and that there was greater diversity in the northern range. We hypothesized that Pleistocene climate change and complex topography led to changes in distribution patterns that shaped the genetic structure of these populations. To test the hypothesis that these ranges represent distinct refugia, we used current and paleoclimate data from the BioClim database to create climate niche models in Maxent to trace migration patterns based on climate alone. We found that the current distribution of *M. thompsonii* is substantially smaller than the potential distribution based on climate, suggesting that soil specialization has substantially affected distribution patterns. Further, when compared to the potential distribution during the last glacial maximum,*M. thompsonii* has spread further north and south from the Colorado River, and most of the favorable habitat in the past was located northwest of the Colorado River where much of the genetic diversity is currently located. Further research using soil types is needed to test these conclusions.

472 **Systematics and Evolutionary Biology**

Social Dominance hierarchies in two liverbearing fishes with different mating strategies.

Zachary Steele*, Paula Deaton, St. Edwards University, Austin, TX

The courtship behavior of livebearing fishes vary greatly, ranging from female choice for elaborately colored males (guppies) to purely coercive mating (mosquitofishes). In livebearers, it is possible to create dominance hierarchies among males by quantifying both aggressive and mating behaviors. The objectives of this study were to determine social rank of males using both aggressive and mating behaviors, and to detect whether male aggression is correlated with mating success. To date, in guppies, we have created dominance hierarchies for 60 male guppies (20 groups of three). Social dominance was driven mainly by male mating behaviors, and not aggression as predicted. With the software ImageJ, we measured male body size and calculated the ratio of orange and black pigmentation to the total body surface area. We ran regression analysis for mating and aggressive behaviors as well as color pigmentation to how they relate to mating success. We found that aggressive behavior is predictive of male mating behavior and that a high ratio of black sigmoid pigmentation is predictive of aggressive behavior. We currently are testing our hypothesis in mosquitofishes to take a comparative approach to dominance rank in livebearers. Since mosquitofish are known to be more aggressive than guppies, this model species may yield a more distinct relationship between aggression and dominance.

480 **Systematics and Evolutionary Biology**

An analysis of the distribution and diversity of Thaumarchaeota within the springs and soils of the northwestern Chihuahuan Desert

Laura Tang* and Jackie Denson, Sul Ross State University, Alpine, TX.

The recent discovery of the widespread distribution of ammonia oxidation by *mesophilic Thaumarchaeaot a* in marine and terrestrial environments signifies their importance in the global nitrogen cycle. However, very little is known about their contribution to nitrification, especially in desert soils. This study presents an analysis of the prevalence and phylogenetic diversity of ammonia oxidizing bacteria (AOB) and ammonia oxidizing archaea (AOA) from locations chosen based on unique microclimates within the Chihuahuan Desert Research Institute, Big Bend National Park, and Big Bend State Ranch Park. Total DNA was extracted from soil samples and universal primer set combinations (Bacteria 27F, 1407R, 1525R) (Archaea A8F, A800R, A1041R) were utilized to amplify 16S rRNA genes. These amplicons were subsequently cloned, sequenced, and phylogenetically analyzed to gain a better understanding of both the distribution and

diversity of these unique Archaea within the Chihuahuan Desert. Relative quantification of AOB and AOA were compared utilizing real time quantitative PCR targeting the *amoA* gene. This survey provides a better understanding of the microbial ecology of the dominate ammonia oxidizers within the desert soils and selected springs of this region.

P482 **Systematics and Evolutionary Biology**

Effects of social dominance on male preference for female size in the guppy (*Poecilia reticulata*)

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In many organisms (i.e. chimps, lizards, blue waxbills) dominant males prefer more attractive females. In livebearing fishes (Poeciliids), attractive females typically are those that are larger because they are more fecund. However, a correlation between male dominance and preference for size has never been tested in livebearers. Livebearers vary substantially in their mating strategies (from courtship to coercion) and males vary in color patters and size (which might influence dominance rank), making them an ideal model system for such studies. We established dominance hierarchies for a population of males, and will use these ranked males to test the hypothesis that more colorful, larger males will be more dominant, and in turn, show mating preferences for large females. Therefore, we predict that larger, more colorful males will choose to mate with larger females, while smaller, less dominant males will choose to mate with smaller females (to decrease competition with more dominant males over mates). We will test our hypothesis using two experiments. The first will determine if dominance correlates with a mating preference attractive females. We will test the ranked males for their mate preference using a dichotomous choice test. The last experiment will focus on the males that ranked intermediate in terms of their dominance. We will test if male preference for attractive females shifts to a less attractive female when in proximity to another male who ranked higher in terms of his dominance. This study will help us understand how male dominance influences male mate choice.

502 **Systematics and Evolutionary Biology**

Morphometry.org: A new website to share, search for, and resample morphometric data

William B. Gelnaw: University of Texas at Austin

Morphometrics, the study of structure through shape, has blossomed as a field of study over the last two decades, with a proliferation of techniques for collecting and applying data. The most immediate impediment to advancing morphometrics as a mode of investigation has been the lack of an efficient way to share data between researchers. Morphometry.org is a new website for sharing traditional morphometrics, as well as 2D and 3D geometric morphometric data, in a searchable database. In the same spirit as GenBank and MorphoBank.org, Morphometry.org aims to improve morphometric investigations by eliminating time-intensive redundant data collection, enhancing collaboration, and allowing incremental addition to ongoing projects. I will review the requirements for submission that make the data searchable and easy to resample. I will also summarize the growth and progress made on the website in its first year since inception and review planned improvements in functionality.

P513 **Systematics and Evolutionary Biology**

Phylogenetic relationships of five members of the family Vespertilionidae (Chiroptera) from malaysian Borneo.

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everal studies have been conducted using molecular data to refine our understanding of the historically unclear phylogeny of chiropterans within the family Vespertilionidae. However, the phylogenetic affinities of some taxa remain unstudied or poorly resolved. Our objective was to sequence and analyze the 12S rRNA mitochondrial gene and RAG2 nuclear gene for the following taxa of vespertilionids: *Pipistrellus petersi; Glischropus tylopus,* and *Hesperoptenus tomesi, Philetor brachypterus,* and *Arielulus cuprosus.* We performed phylogenetic analyses on these taxa together with 99 additional sequences from vespertilionid taxa acquired through GenBank. . Bayesian analysis of 104 taxa, utilizing 587bp of 12S rRNA gene, resulted in poor resolution overall, but *Glischropus tylopus* formed a polytomy to other members of tribe Vespertilionini, with *Arielulus cuprosus* falling sister to *Arielulus aureocollaris.* in tribe Nycticeiini. *Hesperoptenus tomesi* clustered with *Philetor brachypterus*, and that clade formed a polytomy with tribes Nycticeiini and Pipistrellini. Moreover, *Pipistrellus petersi* did not cluster with other pipistrelles, instead falling together with the Hypsugine group. Parsimony analysis of 103 taxa, utilizing 1024 bp of the RAG2 gene, resulted in *Arielulus cuprosus* pairing with its congener and *Hesperoptenus tomesi* falling basal to the remaining tribes on the family, with *Myotis* used as the outgroup. These relationships were not significantly supported in the Bayesian analysis and the lack of resolution is probably due to the small number of bases analyzed.

519 **Systematics and Evolutionary Biology**

Phylogenetic relationships of southern African rodents of the genus *Gerbilliscus* (Muridae: Gerbillinae)

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The murid rodent genus *Gerbilliscus* is widespread and abundant throughout sub-Saharan Africa. Several molecular and morphological studies have examined the evolutionary relationships of this genus in eastern and western Africa. However, no study to date has produced a complete phylogeny for the southern African forms. The most recent checklist for this group suggests that the genus contains at least six species. Herein, we examine mitochondrial gene sequence data from cytochrome b and cytochrome oxidase I; nuclear AFLPs; as well as karyotypes to determine the number of species and the evolutionary relationships of the southern African *Gerbilliscus*. We present evidence that there are at least ten well-supported lineages in this genus. Coalescent modeling indicates that the southern African forms originated from east African with a subsequent radiation into southern Africa at times that correspond to African savannah expansion during the Pleistocene.

520 **Systematics and Evolutionary Biology**

Phylogeography of the American Hog-nosed Skunk, *Conepatus leuconotus* (Lichtenstein, 1832)

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Recent advances in phylogeographic studies, including paleo-ecological niche modeling (PENM), are helping to rapidly advance the field of phylogeography as one of biology's most integrative disciplines. One important contribution PENM has made to our understanding of phylogeography is in developing spatially-explicit hypotheses for subsequent testing using methods of statistical phylogeography. PENM provides an alternative technique for identifying Pleistocene refugia for taxa lacking sufficient fossil data. Such is the case for the American hog-nosed skunk *Conepatus leuconotu*s (Lichtenstein, 1832), a mesocarnivore currently distributed from southern Colorado to Nicaragua. Using PENM, we established five *a priori* hypotheses regarding the demographic history of *C. leuconotus.* Models indicated the possibility of at least four potential Pleistocene refugia. Using statistical phylogeographic methods and mitochondrial DNA sequence data, we plan to test for the existence of these four refugia in addition to three alternative demographic hypotheses and one time since divergence hypothesis. To date, 78 modern samples of *C. leuconotus* from across their distribution have been sequenced for cytochrome-b, D-loop, and ND5 genes. Due to reduced availability of modern tissue samples, we have augmented our modern dataset with historic tissues from museum specimens (1891 – 1998). To date, 100 historic samples have been successfully extracted and are awaiting sequencing for the cytochrome-b, D-loop, and ND5 genes. The 2000-plus base-pairs from these 178 individuals will enable us to statistically test for genetic signatures of putative Pleistocene refugia in *C. leuconotus*, furthering our understanding of how past climatic conditions have helped shape the evolutionary history of this enigmatic carnivore.

P530 **Systematics and Evolutionary Biology**

Coercive males alter mating behaviors according to risk of sperm competition

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We tested the hypothesis that males alter mating behaviors according to risk of sperm competition. In two experiments, we manipulated sperm competition risk (SCR) using the following treatments 1) virgin females (SCR = 0); 2) virgin females mated with one male (SCR = 1); 3) nonvirgin field caught females (SCR = 2.5, average number of fathers per brood in nature); and 4) field caught females mated with one male (SCR = 3.5). Females were kept in isolation for 7 days prior to being placed in treatments for 24 hours. One focal male was then placed with a female from a randomly selected treatment and male mating behaviors were scored. Males did not have visual contact at any time with females during treatments. Males mated at significantly higher rates with nonvirgin females with no male. We then repeated experiment I and scored both male and female behaviors. Results suggest that both sexes (via female resistance and male coercion) influence male behaviors when faced with SCR. A third experiment manipulated risk of sperm competition using only field caught females with the following treatments: no male, one male, three males, and another female. Males displayed less frequently to females in the 1 male treatment over those in the 3 male treatment, lending further support that males alter mating behaviors as a result of risk of sperm competition. Future experiments will focus on specific mechanisms used by males to discriminate against females who present higher SCR.

P532 **Systematics and Evolutionary Biology**

Coercive males discriminate against females with which they have recently mated

Raelynn Deaton*, St. Edward's University, Clint Anders, Sam Houston State University, Jeff Goessling, Alburn University, Craig Sargent, University of Kentucky

In two repeated measures experiments, we tested whether coercive male mosquitofish (*Gambusia affinis*) discriminate against females with which they were already mated. We presented one male with one female and allowed the dyad to mate for 10 minutes. During this time we recorded the number of copulation attempts toward the female. We then separated the pair for 24-hours and allowed them to mate again under the same conditions. However, during the second trial, half of the females were familiar females (those with which males were previously tested) and half were novel females. Again, we recorded number of copulation attempts toward the female. There was no difference between male behaviors toward either female, suggesting that either 1) 24 hours is too long of an isolation period for males to discriminate among females, or 2) that males do not discriminate among novel and familiar females regardless of how long they have been separated. To incorporate more short-term mating experiments, we isolated the pair for 4-hours and only 1-hour before retesting (following the same methods as outlined above). Results showed that after 1 hour, males reduced their mating attempts toward familiar but not novel females. Thus, after only one hour of separation, males clearly discriminate among females with which they have previously and recently mated. This study provides insight into coercive males cognitive abilities in relation to mating and possibly risk of sperm competition.

533 **Systematics and Evolutionary Biology**

Effects of competitor size ratio on male aggression and mating in the coercive livebearing western mosquitofish (*Gambusia affinis)*

Hillary Evans*, Tony Voong, St. Edward's University, Jessica Sanchez, Florida International University, and Raelynn Deaton, St. Edward's University

This study explores male-male competition in relation to body size in the coercive western mosquitofish, *Gambusia affinis*. We hypothesize that male body size and size ratio of competitors interact to cause shifts in male mating tactics. In two experiments, we compared male behaviors when in direct and indirect competition with other males. In the first experiment, one focal male was exposed to one female and three other male competitors (all individuals allowed to interact in an open-water experimental design), while maintaining a constant male density of four. Size ratio treatments consisted of competitors in the ratios of 1 small:2 large; 2 small:1 large; 3 small; 3 large, using male size as a covariate. Neither competitor size ratio nor size of the focal male influenced male mating or competitive behaviors when all individuals were allowed to interact. In addition, male body size did not covary with mating or competitive behaviors. In the second experiment, all conditions were the same except competitor males were isolated in a Nalgeen jar such that the focal male was not exposed to direct competition. These data are currently being analyzed and also will be presented to compare male behaviors when in direct and indirect competition with other males that vary in size. Future studies will examine actual paternity of offspring for large and small males under varies competitor size ratios to detect whether shifts in males behaviors translate into increased reproductive success.

534 **Systematics and Evolutionary Biology**

Strength of male preference for female body size in three species of livebearing fishes that differ in mating strategies

Claire Hemmingway*, Malea Harrison, Zachary Schertz, Natalie Willard, St. Edward's University, Brian Boutwell, Sam Hamontree, Janalyn West, Sam Houston State University, Stacy Stoops, Texas A&M, and Raelynn Deaton, St. Edward's University

Males mate choice is often a function of female body size. In some species (e.g. fishes) larger females usually are more fecund, and as a result males often prefer to mate with larger females to increase reproductive success. In livebearing fishes (Family Poeciliidae), studies have shown male preferences for larger females in most species tested (with the exception of the least killifish). However, most studies have focused on one point in time, and not repeatedly to detect whether this preference holds up over multiple tests (herein called strength of preference). Therefore, we tested male preference for female body size using a repeated measures design in three species of livebearers that differ substantially in mating strategies. Using a traditional dichotomous choice test (with visual only and visual and olfactory cues presented), we tested one male with two females (one large and one small) over five consecutive days (for 10 minutes) for coercive *Gambusia* and courting *Poecilia* (P. latipinna and P. reticulata). While we predicted that males for both species would prefer larger females, we found this preference to be true for day one only. During days two through five, males did not differentiate between females, nor did strength of preference change. Surprisingly, neither species showed strong preferences for larger females. These studies indicate that male preference for larger females in livebearers may not be as strong as traditionally thought.

560 **Systematics and Evolutionary Biology**

Dynamics of hybridization between two species of woodrats (genus *Neotoma)*

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The parapatric distribution of two species of woodrats (*N. floridana* and *N. micropus*) extends for over 2,200 kilometers, stretching from the Gulf of Mexico to southeastern Colorado. The only reported area of contact between these two species is a hybrid zone in western Oklahoma estimated to be approximately 3 km^2 in size. In 1988, 103 individual woodrats were collected from the hybrid zone. Eleven genetic markers, one mitochondrial (Cytochrome-*b*) and two nuclear (Alcohol Dehydrogenase and Beta Fibrinogen) genes, along with eight microsatellite loci were used to develop a composite genotype for each individual to ascertain genetic identification of specimens and for detection of hybridization. Composite genotypes indicated 12 individuals were identified as parental *N. micropus*, 87 as hybrids, and 4 as parental *N. floridana*. Preliminary analyses revealed a high frequency of bidirectional hybridization (84%). None of the 87 hybrids were identified as F_1 individuals. Given the high frequency of non-F_1 hybrids, little to no reduction in fitness is evident, indicating that the zone is maintained either by the Hybrid-Superiority Model or the Hybrid-Equilibrium Model. Linkage disequilibrium, population substructure, and proportion of genotypic classes will be examined to determine which of the remaining models is responsible for the maintenance of the hybrid zone.

P561 **Systematics and Evolutionary Biology**

Preliminary anaylsis of the cranium of *Gekko gecko* using high resolution X-ray Computed Tomography (HRXCT)

Aurelia Mapps*, Cristhian Cadena, Patrick Lewis, Sam Houston State University, Huntsville, TX

The genus *Gekko* is indigenous to southeastern Asia, ranging from Indonesia to Japan. The species richness of this genus, which contains over 45 species, has led to many questions on the evolutionary relationships among its members. Previous studies have attempted to determine the intrageneric relationships of the *Gekko* species. The monophyly of the group has not been supported, however, due to the inclusion of misidentified species. As such, the phylogeny of the genus remains poorly understood. Additional morphological analyses are needed in order to help determine the evolutionary relationships between these geckos. The use of High Resolution X-ray Computed Tomography (HRXCT) will permit the detailed description of the cranial morphology of the *Gekko gecko* and will assist in finding cranial characters that can be then used to evaluate the phylogenetic relationships within the genus. Our preliminary results indicate that the squamosal bone is spherical posteriorly, unlike the elongated shape found commonly in sclerogossans. Additionally, fused frontal and fused parietal bones are present in *Gekko gecko*, a common character in some gekkonids.

P586 **Systematics and Evolutionary Biology**

Cranial morphology of the kalahari round-headed worm lizard (*Zygaspis quadrifons*) using high resolution X-ray Computed Tomography

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Amphisbaenians are a poorly understood clade of fossorial, mostly legless lizards. Because of their highly derived anatomy and the scarcity of available specimens, the systematics of the clade and its placement within the squamates remains uncertain. Phenetic approaches to the systematics of the clade cluster the species into four subgroups according to burrowing behavior and cranial morphology: the 'shovel-headed', 'round-headed', 'keel-headed', and 'spade-headed' morphotypes. Recent phylogenetic studies, however, question the monophyly of these morphotypes. Detailed morphological analyses on individuals across the different morphotypes are therefore required to better resolve the clade. Montero and Gans offered the first bone-to-bone description of the cranium of the 'round-headed' *Amphisbaena alba* using traditional methods. Subsequently, detailed morphological analyses of the skull of the 'shovel-headed' *Rhineura hatcherii* and 'spade-headed' *Diplometopon zairudny* were accomplished. The aim of our study is to expand the current knowledge of amphisbaenian cranial morphology by producing the first detailed cranial description of a 'round-headed' amphisbaenian using High Resolution X-ray Computed Tomography (HRXCT), using the African species *Zygaspis quadrifons*. The use of nondestructive HRXCT imagery is ideal for this study due to the rarity and diminutive size of the specimens available. Unlike the 'spade-headed' *D. zarudnyi*, our preliminary results indicate the absence of a squamosal in *Z. quadrifons* and the presence of the prefrontal. Overlapping sutures are observed between the nasal process of the premaxilla and the nasals, allowing contact between the nasals medially. Additionally, the frontal process of the maxilla is not bifurcated, as seem in the 'spade-headed' morphotypes.

587 **Systematics and Evolutionary Biology**

A re-examination of the paratypic series of the fossil land snail *Lysinoe breedlovei* (Gastropoda:Pulmonata) of West Texas using X-ray Computed Tomography.

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The presence of fossil land snails from the Eocene age Colmena and Chambers tuffs of the Vieja Group, Presidio County, Texas was first noted by the vertebrate paleontologist J.A. Wilson (1968). Pampe (1974) in publishing the first taxonomic listing of fossil invertebrates from the Trans-Pecos region assigned several specimens from this series to fossil taxa known from localities outside of Texas. Among these were*Oreohelix grangeri* from the lower Eocene of Wyoming and *Helix leidyi* from the Eocene of Nebraska. Roth (1984) in his description of a new pulmonate fossil land snail, *Lysinoe breedlovei*, re-assigned the Texas material of *Oreohelix grangeri* and *Helix leidyi* to the new taxa; he also assigned the *"Helix"* sp. specimen from the Middle Oligocene of northeastern Mexico to this new species. This current study re-examines morphological variation within the paratypic series of *Lysinoe breedlovei* using X-ray Computed Tomography as well as existing differences in the ages and faunal associations of the original type localities. X-ray CT scanning allows for a non-invasive examination of the internal morphology that was not available in previous studies. Using the computer software program IMAGEJ, linear and angular measurements were obtained for multiple characteristics. Preliminary results of the initial analysis of the morphometric characteristics do not support the assignment of the *Oreohelix grangeri* nor the *"Helix"* sp. material to the species *Lysinoe breedlovei.* These two specimens exhibit significant outlying differences in morphology as well as differences in geological ages and paleoclimates of the original collection localities.

P608 **Systematics and Evolutionary Biology**

Do male guppies shift mating behaviors when faced with different sized competitors?

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In livebearing fishes, there is considerable variation in male body size, often influencing male-male competition. In some livebearers, large males outcompete smaller males for mates, while in others, females choose larger males because those males possess certain characteristics preferred by females (e.g. orange coloration in guppies). In guppies, larger males typically court females while smaller males exhibit sneaky mating tactics. Male guppies shift their mating frequencies when male densities are high and sex ratios are male biases. However, no studies have investigated potential shifts in male mating behaviors when the size ratio of the competitors varies across treatments. Here, we present results from two experiments where we test potential changes in small vs. large male mating behavior as the size ratio of competitors change. In two separate experiments (one where we allow direct male-male competition and one where we separate males from competitors) we test shifts in male mating when three competitors vary in their size ratio relative to the focal male (e.g. all larger, all smaller, etc.). We predict that larger males will exhibit fewer matings when competing with other larger males (due to trade-offs between mating and direct competition), and more matings when competing with smaller males (due to their ability to outcompete smaller males). We predict that smaller males will exhibit fewer matings with other smaller competitors (again due to direct completion with same-size competitors), but more matings with larger male competitors (due to sneaky mating tactics). Data are currently being analyzed and will be presented.

P311 **Terrestrial Ecology and Management**

The effect of habitat restoration for the black-capped vireo on ant diversity at the Wild Basin Wilderness Preserve

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This study proposes to monitor the ants of Wild Basin Wilderness Preserve/Vireo Research Area in relation to habitat restoration for the black-capped vireo. Specifically we want to see if manipulation of habitat for the vireo will affect the associated ant fauna, as ants are good bio-indicators. Adjacent to Wild Basin is the Vireo Research Area that once held a significant number of black-capped vireo territories. The vireos had not nested in this area for over a decade so in an attempt to attract nesting birds, the City of Austin removed a dense stand of ash juniper in order to create shrubby growth habitat that the vireo prefers. A plot of 20 pitfall traps, (four rows of five traps, each trap located 10 m apart) were established in this recently restored area. Another plot of 20 pitfall traps was established in a nearby natural meadow. One question is how different in ant fauna are the two plots and second, how long might it take for the treated plot to approach diversity of the natural (meadow) plot? This fall we ran the traps for the first time and are still analyzing the data, but will present our results at this meeting.

320 **Terrestrial Ecology and Management**

Mexican rice borer (Lepidoptera: Crambidae) host plant preferences and underlying nutritional associations

Allan T. Showler and Thomas E. Reagan

The Mexican rice borer, *Eoreuma loftini* (Dyar), has become the dominant pest of sugarcane in South Texas. It has recently spread northward into Louisiana's sugarcane production region. We have shown that certain weedy/forage grasses, especially Sudangrass, Johnsongrass, and barnyardgrass, are preferred for oviposition over other host grasses. In terms of crop species, the Mexican rice borer prefers corn by more than 5.5-fold over sugarcane and sorghum. The role of corn in the range expansion of the Mexican rice borer is poorly understood, but corn harvest, which occurs several months before sugarcane harvest, causes sharp late-season increases in sugarcane infestation. Analyses of free amino acids and sugars in the various host plants studied revealed that, although free amino acids have a role in preference among sugarcane cultivars, higher fructose concentrations were associated with preferences between host plant species. Sugarcane grown on soil augmented with compost produced more stalks per sett than in non-augmented soil, but elevated Mexican rice borer infestations offset that benefit, associated with greater plant nitrogen and fructose in composted field plots. Drought-stressed sugarcane plants were also preferred because of associated accumulations of free amino acids (and it is possible that fructose might have had a role).

322 **Terrestrial Ecology and Management**

Compensatory growth in southern mule deer

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Compensatory growth is the accelerated growth of an individual, after a period of poor nutrition. Studies have demonstrated compensatory growth in ungulates at high latitudes but the compensation is incomplete. This study evaluated compensatory growth in response to nutrition and competition in southern mule deer (*Odocoileus hemionus*) at low latitudes where winter weather is more amenable to animal growth. Over the 27-year study, dressed weight, sex, and age of 1,730 mule deer were measured from a study site in southern California. We used Akaike Information Criteria to determine that a model, with predictors for sex, age, precipitation (proxy of nutrition), and a hunter-harvest index (HHI; proxy for competition) best explained the variance in dressed weight (r^2 = 0.81). There was a positive relationship between precipitation and a negative relationship between HHI and dressed weights. These relationships were additive as precipitation and HHI affected dressed weights of each age class and sex the same. Our study suggests that southern mule deer that experience a nutritionally poor year can completely compensate for the weight disparity the next year given amenable biotic and abiotic conditions.

336 **Terrestrial Ecology and Management**

Temporal variations in rumen-reticulum fill, micro-organism abundance and absorptive capacity in southern white-tailed deer

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Whether gut fill, micro-organism abundance, and absorptive surface area are driven by the same factors has received little attention and is needed to understand animal response to environmental heterogeneity and animal demands. Moreover, there has been little study of plasticity in rumen-reticulum functions at lower latitudes where seasonal predictability in food supplies can be low. We examined what drives rumen-reticulum fill, micro-organism density (per ml), micro-organism abundance (per rumen), and the surface area of rumen mucosa (SEF) of white-tailed deer (*Odocoileus virginianus*) sampled in autumn, late winter, and late summer in central Texas. Over the course of the study, we obtained samples from 139 deer. Using Akaike Information Criterion model selection corrected for small sample size, we concluded that animal demands and diet composition influenced rumen-reticulum fill, however, micro-organism density (numbers/ml of rumen fluid) was invariant to the predictors we considered but the total number of micro-organisms in all the rumen-reticulum fluid was influenced by rumen-reticulum fill, and SEF was influenced by diet composition. The response of fill to both animal demand and diet composition indicates deer could increase food intake when the diet was more digestible to meet the energetic demands of reproduction. The lack of seasonal variation in micro-organism density is probably due to reduced seasonal variation in diet composition. Deer in our study had lower seasonal differences in SEF than deer at high latitudes, an indication that seasonal changes in fill, micro-organism abundance, and surface area of rumen mucosa is probably less than at high latitudes.

P350 **Terrestrial Ecology and Management**

Rapid spread of *Balclutha rubrostriata* (Hemiptera: Cicadellidae) in Texas and southwestern Louisiana, USA and associated host plants

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The red streaked leafhopper, *Balclutha rubrostriata* (Melichar), is an invasive insect from southeastern Asia that is known to be a vector for the phytoplasma that causes Sugarcane White Leaf Disease (SCWL). Sugarcane is a vital crop for the United States and is even being considered as a biofuel source. The purpose of this survey was to determine whether *B. rubrostriata* has established populations in Texas and Louisiana, USA; and, if established to estimate its range expansion. The gulf coast region of Texas, east Texas, and 2 southwestern parishes of Louisiana were surveyed for the red streaked leafhopper. Samples of the leafhopper were collected in all gulf coast regions and the majority of east Texas counties. However, it was only collected in one Louisiana parish. The leafhopper appears to be closely associated with an invasive grass, King Ranch Bluestem, *Bothriochloa ischaemum var. songarica* (L.), throughout much of its present range in the United States, and it is now common along much of the Texas Gulf Coast and is moving into Louisiana. With *Balclutha rubrostriata* having a close insect-host system with King Ranch Bluestem, this insect could be carried out as far as the bluestem is able to disperse. If *Balclutha rubrostriata* acquires SCWL, the insect-virus complex could then threaten the United States sugarcane crops.

368 **Terrestrial Ecology and Management**

Habitat determination and genetics of the gulf coast kangaroo rat (*Dipodomys compactus*) in northern Kenedy county, Texas

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The Gulf Coast Kangaroo rat (*Dipodomys compactus)* is a member of the rodent family Heteromyidae. Its primary range is over southern Texas into northern Mexico, most often found in counties near the coast. This experimental study in northern Kenedy County, Texas, was initiated to determine how this species chooses it habitat. Two habitat grids were created: one sprayed with a broadleaf herbicide, the other not. Live trapping and floral collections were conducted from September 2011 to June 2012, 86 species in 45 families were collected. Trap success for both grids over the entire collection time was 5.8%. The diversity of rodents at the control grid (not sprayed with herbicide) had a greater diversity and had almost twice any many individuals as the experimental grid. The amplified fragment length polymorphism (AFLP) data suggests there was no statistically significant difference in the genetic composition between individuals from the experimental and control grids.

382 **Terrestrial Ecology and Management**

Interactions of *Grassiella wheeleri* (Escherich 1905) with *Solenopsis invicta* Buren

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Silverfish (Insecta: Thysanura: Nicoletiidae) are associated with Nearctic and Neotropical ant species (Insecta: Hymenoptera: Formicidae). Field and laboratory observations of *Grassiella wheeleri* (Escherich 1905) and *Solenopsis invicta* Buren, the red imported fire ant (RIFA), will be presented as regards the silverfish occurrence, predation, trail following, flooding behavior and interactions with ant workers.

397 **Terrestrial Ecology and Management**

Influence of fire on and succession of microbial communities after disturbance in Marfa grasslands

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The Rock House Fire, April 9, 2011, burned 90% of the Mimms Ranch west of Marfa, Texas and continued to burn into the Davis Mountains. Lack of natural resources for animals and plants due to this wildfire and the exceptional drought conditions of 2011 have caused environmental changes in West Texas. Evaluating the composition of microflora in soil-surface communities is essential to overall rangeland health. Three distinct ecological zones in the fire zone were studied: burned, unburned but trampled, and unburned areas. Mean soil pH in burned areas was significantly higher (7.6) than in trampled (6.9) and unburned areas (6.4) due to fire. DNA extraction of soil was used as a measure of biomass. Quantitative Polymerase Chain Reaction (qPCR) was utilized to compare total microbial consortia in the post fire growth season. Quantification included universal primers sets targeting bacterial 16S (total bacteria), archaeal 16S (total archaea), as well as the following functional metabolic genes; amoA (ammonia oxidizing bacteria), amoA (ammonia oxidizing archaea), dsrA (sulfate reducing bacteria), nifH (nitrogen fixing bacteria), nirK (nitrite reducing bacteria), cel48 (cellulose degrading bacteria), and mcrA (methanogenic archaea). NextGen genetic analysis (Roche-454 FLX sequencer) will be performed to identify the genus of microbes. Data suggests a global reduction of total microbial numbers across all different metabolic strategies in the burned areas. Results indicated that fire had an impact in terms of the relative frequency, canopy cover, and basal cover of vegetation and microbial numbers in burned sites. Both vegetation and microbial numbers recovered after significant rainfall in 2012.

403 **Terrestrial Ecology and Management**

Status of the tamarisk leaf beetle *(Diorhabda* spp.) as a saltcedar (*Tamarix*) biocontrol agent along the Rio Grande River in Presidio County and its impact on a non-target species, *Tamarix aphylla*

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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 one (*D. sublineata*, the subtropical tamarisk beetle) dominating the biocontrol efforts. In addition, observations indicated that the 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 ten sites along the Rio Grande River, from Lajitas, TX to Candelaria, TX, are being monitored to determine the long-term impact from the leaf on saltcedar and on the non-target athels in the region.

P449 **Terrestrial Ecology and Management**

Climate niche comparative analysis of *Vulpes velox* and *Vulpes macrotis*

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Vulpes velox and *V. macrotis* are two fox species endemic to North America. The ranges of each species overlap very little and are located on different sides of the Rocky Mountains in western and central North America, Canada, and Mexico. The research conducted in this study was intended to explore possible reasons for range differences. We did by 1) comparing GPS coordinates gathered from collected specimens stored by the Smithsonian Museum of Natural History to climate variables collected from the WorldClim database and by 2) analyzing these species' current ranges compared to current climatic conditions and potential climatic changes. Discriminate analysis suggested that precipitation is a more influential variable than temperature for distinguishing the ranges of *V. velox* (wetter) and *V. macrotis* (drier). Potential niche models compared for both species using the program Maxent suggest that the ranges of both foxes will be impacted by changing climate over the next century, with *V. macrotis* moving predominantly east and *V. velox* moving predominantly north. These models suggest a greater potential range overlap in New Mexico and greater range loss for *V. velox* than *V. macrotis.* However, *V. macrotis* is predicted to lose sensitive habitat in California currently used by the endangered subspecies *V. macrotis mutica.* More research is needed to test these conclusions, but preliminary findings indicate the importance of climate in evaluating potential risks for range restrictions or other serious impacts on*V. velox* and *V. macrotis* in the future.

466 **Terrestrial Ecology and Management**

Results of a Mammal Survey of the Otonga Nature Reserve, Ecuador

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A mammal survey was conducted of the Otonga Nature Reserve, Cotopaxi Province, Ecuador. The Otonga Nature Reserve is located on the western slope of the Andes (0°25'11''S, 79°0'11''W). The ecosystem of the survey area is subtropical cloud forest. Sherman traps, pitfall traps, tomahawk traps, and mist nets were used to collect specimens at an elevation of 2100 meters (6890 feet). A total of 146 specimens of 17 species (*Neusticomys monticolus, Nephelomys moerex, Nephelomys sp., Thomasomys caudivarius*, *Thomasomys* sp., *Melanoymys caliginosus*, *Caenolestes fuliginos*, *Marmosops impavidus, Sturnira luisi, Sturnira bidens, Sturnira ludovici, Anoura caudifer*, *Anoura* sp., *Anoura cultrata, Platyrrhinus nigellus, Platyrrhinus dorsalis, Myotis albescens*) were collected from the survey area (and two additional species were observed). Shannon-Wiener diversity analyses were performed for the overall mammalian diversity and the bat diversity, and the values were compared to other nearby locations.

517 **Terrestrial Ecology and Management**

The terrestrial and arboreal hide box selection of North American rat snakes (*Scotophis spp.*)

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The North American rat snakes (*Scotophis spp.*) are known to be semi-arboreal animals and have been recorded using arboreal hiding places. Studies often suggest that snakes found in elevated shelters were there due to the influence of a prey item. In the lab setting rat snakes are fed mice and feeding occurs at ground level. A total of 24 captive born rat snakes *(Scotophis spp*.) of varied intergrades were used to determine their affinity for elevated hide boxes. Each snake was placed in a separate testing tank with 3 hide boxes at different elevations. Observations on their selection of hide boxes and behavior were recorded daily over 4 weeks/rounds of testing. Data was collected on which hide boxes the individuals preferred with differences being noted between sexes, intergrade crosses and with regards to room temperature. The rat snakes were found in the top hide boxes most often (52.1%) and males were found in the top boxes more than females. There was a difference between the different rat snake intergrades with the yellow and Texas intergrades being found in the top box the most and the grey and Texas intergrades found in the top box the least. It is apparent by this study that rat snakes do select hide boxes for reasons other than foraging. While this may be the case for this study, the information on the snakes' terrestrial and arboreal behavior may still have major implications in the ecology of prey items such as birds, small mammals, and reptiles.

524 **Terrestrial Ecology and Management**

Defense mechanisms and predatory awareness response of the eastern fox squirrel *Sciurus niger*

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The Eastern Fox Squirrel, *Sciurus niger*, is a widely distributed rodent in eastern North America and is preyed upon by a variety of predators. Communication serves as a useful predator-avoidance method for Eastern Fox Squirrels because they can transmit their agitation level to others around them while responding to a predator. The squirrel's response can be correlated with their level of agitation or fear and assigned a numerical value based on the hierarchical response system created for this experiment. Forty-seven squirrels were recorded and analyzed during call blasting sessions where the calls were played in a randomized orderings of predator calls. Each matchup between squirrel and predator call was given an agitation ranking based on the elicited response. Predator calls were produced by a call box playing MP3 recordings, connected to a speaker. Twenty-seven calls from nine animals, three from each animal, were used for this experiment; nine calls from predators found in this area (a coyote, a bobcat, and a hawk), nine calls from predators most likely not seen in this area (a wolf, a mountain lion, and an eagle) and nine calls from predators never found here (a hyena, a lion, and a snowy owl). The conjunction of data from both The University of Texas campus and the Brackenridge Field Laboratory over a period of several weeks allowed for a more well-rounded analysis. The data show that squirrels have a higher response to calls of common predators in their area than to calls of uncommon and foreign predators.

541 **Terrestrial Ecology and Management**

Genetic structure of an urban population of striped skunks

Wesley A. Brashear*, Loren K. Ammerman, Robert C. Dowler

Striped skunks act as vectors or reservoirs for many infectious diseases, and are therefore often target species of disease management programs. This species is highly adept at persisting in anthropogenically altered habitats and an understanding of how landscape features affect their movement and dispersal in these habitats would aid in the development of disease control/eradication protocols. This understanding can be achieved through coupled analyses of the genetic structure of a population and the geographic area in which that population persists. The aim of this study was to test the hypotheses that (1) striped skunk populations in an urban environment do not exhibit panmixia, (2) the landscape features and processes responsible for the patterns in the population's genetic structure can be identified, and (3) the relative influence of those features and patterns can be quantified. We collected 78 tissue samples from striped skunks within the city limits of San Angelo, Texas. We amplified the samples for 15 microsatellite loci, and the effects of isolation by distance, as well as the effects of land use/cover, on the genetic structure of this urban population of skunks were assessed.

580 **Terrestrial Ecology and Management**

Metagenomic characterization of the karst soil microbial communities characteristic of habitats for black-capped vireos at Wild Basin (Travis Co., TX)

Caitlin Cognian*, Joanna Pulido, Erik Escobar, Mohammad Abu-Esba, Monica Swartz, Charles Hauser, St. Edward's University, Austin TX 78704

Wild Basin Wilderness Preserve is part of the Balcones Canyonlands Preserve (BCP), 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, this project aimed to characterize the soil microbial communities present in the karst soils present at the Wild Basin Preserve in response to a variety of soil remediation treatments. Soil metagenomic analyses of microbial rDNA (archeae, bacterial and fungal) communities present were conducted using Illumina technology from each of 5 treatment areas. A preliminary analysis of the data obtained has identified: 1302, 1356, 1693 archeae, bacteria and fungi operational taxonomic units (OTUs), respectively. The prevalence of archeae present in these karst soils is significant, and may reflect microbial adaptations to this unique environment. The long-term goal is to better manage BCP lands for Black-capped Vireo habitat and ecological health. Integrating the information gleaned from a variety of plant – microbial communities with information about biological functions encoded within these communities, will potentially open a new door on plant conservation and restoration efforts and contribute to our understanding of the unique role(s) karst-soli communities play in global carbon balance.

P581 **Terrestrial Ecology and Management**

Metagenomic characterization of the soils and microbial communities characteristic of habitats for black-capped vireos at Wild Basin Wilderness Preserve

Joanna Pulido*, Caitlin Cognian, Erik Escobar, Mohammad Abu-Esba, Monica Swartz, Charles Hauser, St. Edward's University, Austin TX 78704

The Edwards Plateau, consisting a region of uplifted limestone, provides an island of karst 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 fauna, none of which have been described. Wild Basin Wilderness Preserve is 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, a soil metagenomic characterization of microbial communities present (archeae, bacterial and fungal) was conducted using Illumina technology from each of 5 treatment areas. A preliminary analysis of the data obtained has identified: 1302, 1356, 1693 archeae, bacteria and fungi operational taxonomic units (OTUs), respectively. The goals of this project are to: characterize the genomic and metabolic complexity of the bacterial, archaea and fungal communities characteristic of karst soils; identify restoration techniques to better manage for Black-capped Vireo habitat; contribute to our understanding of the unique role(s) karst-soil communities play in global carbon balance.

584 **Terrestrial Ecology and Management**

Microhabitat Use by an Urban Population of Water Snakes

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>With continued human encroachment on the landscape, species must either adapt to increasingly altered habitats or disappear. Identifying habitat preferences in urbanized species is important to understanding why certain species are able to persist in the face of urbanization. A sustaining population of Blotched Watersnake*, Nerodia erythrogaster*, persists along a 400-meter section of an urban watershed on The University of Texas campus. Twenty-six habitat variables were recorded for a series of 106 random points along the watershed, including distances to water and from cover, temperature, % cover, and vegetation type. These same habitat variables were measured at 234 relocations of four radio-telemetered watersnakes. Additional behavioral variables such as activity and visibility were taken for each snake at each relocation event. These data provide a description of all available habitat as well as microhabitats chosen by snakes. Differences in habitat selection by snakes, between sexes and individuals, will be discussed and compared to previous descriptions of watersnake habitats. Future research will investigate the correlation and variance of each habitat variable across the watershed and determine whether watersnakes in this population demonstrate microhabitat specificity.

P588 **Terrestrial Ecology and Management**

Nest site characteristics of Mourning Dove and Eurasian Collared-dove nests in an urban environment

Brittnay Deanne Walton* and Andrew C. Kasner, Wayland Baptist University, Plainview, TX

The objective of this study was to determine nest site characteristics of Mourning Dove (*Zenaida macroura*) and Eurasian Collared-dove (*Streptopelia decaocto*). During Winter 2012-Winter 2013, searches were conducted for previously used dove nests along 8ha of riparian corridor in a public park in Plainview, Hale County, Texas, where both species occur during the breeding season and throughout the year. Trees containing nests were identified to genus or species and diameter at breast height (DBH) was measured. In addition, a sample of non-nest tree DBH was measured for comparison, and tree species composition of the site was quantified to determine whether nest tress were used disproportionately to their relative abundance at the site. There were a total of 30 nests in 25 tress (27 nests in Elm tress [*Ulmus* sp.], 3 nests in a Hackberry tree [*Celtis* sp.], and 0 nests in Honey Locust trees [*Gleditsia triacanthos*]). There was no significant difference between DBH of nest trees and non-nest trees (Non-nest DBH = 4.79 ± 4.45cm, Nest DBH = 6.24 ± 3.93cm; T=1.38, P=0.173). However, Hackberry was used in greater proportion than expected and Honey Locust was used less than expected based on relative abundances at the site (χ^2=19.17, P<0.001), with the single Hackberry used containing 3 nests. Elms were used in proportion to availability, with most containing only one nest. Hackberry may offer more nest concealment, and their favorability and low abundance may lead to competition between the two dove species as they establish nests. Future work will examine possible competition for nest sites between Eurasian Collared-dove and Mourning Dove and will examine other competitive interactions, nest reuse, and nest success of both species.

590 **Terrestrial Ecology and Management**

A national melting plot: introduced and native plant Beta diversity patterns across the United States

Richard J.W. Patrock

Exotic species have become increasingly more wide ranging and abundant around the world and especially in the United States. This globalization of diversity results largely from more vibrant human motion and trade, as well as disturbing human-promoted habitat changes. This study compiled, described and compared national state-wide inventories of introduced and native plant species for the contiguous states in order to evaluate database influences on ecological hypotheses concerning Beta diversity components for these two classes of plants. I started this evaluation with the Plants and EDD MapS databases because of their uniformity and accessibility. Beta diversity components were estimated using Betapart (in R, Baselga and Orme 2012). Preliminary results indicated both adventive and native plant classes were found in about 31% (8-67%) of counties, averaged within and across states by taxon. Texas had the lowest values for both classes of plants, largely because of the number of counties. There was a marked reduction in % state occupancy by native plants going westward across the Mississippi River but not for introduced plants. Finally, I compare and contrast with these results, those found using more recent and comprehensive databases for many of these state floras.

P593 **Terrestrial Ecology and Management**

Towards a Novel Engineered Solution for the Quantification and Modeling of Predator-Prey Interactions in a Captive Terrestrial Environment

Joseph Falade, Jared Fadow, Dale McDonald, Michael Shipley, Midwestern State University

The study of predator-prey interactions is critically important. For example, natural resource management of aquatic ecosystems subject to commercial harvest involves consideration of biomass levels, employment, taxation, revenue, and sustainability. Management of terrestrial populations such as the reintroduction of wolves (Canis lupus) into the northwest United States has spawned heated debate. Field observations, laboratory investigations, and mathematical analyses are vital tools to understand natural phenomena. Particularly interesting is the relationship between mathematical models developed for predictive purposes juxtaposed with experimental investigations and observations from nature. The literature details a debate concerning the mathematical model that best predicts natural phenomena. These models are known by the nature of the predation functional response; prey-dependent or ratio-dependent. The disagreement between these models stems from the question as to if predators interfere with one another during the predation process. The goal of this investigation is to propose an engineered design of a captive predator-prey environment. The purpose of the proposed design is to determine if quantification of predator-prey characteristics may be more easily accomplished if design and manufacturing practices followed within the engineering sciences permeate the development of an ecology population dynamics laboratory. It is hoped that if the design is realized a protocol may be established allowing for a more efficient and less human labor intensive quantification of predator (wolf spider, Lycosidae) and prey (cricket, Gryllidae) biomass/behavior. Following this protocol, it is then hoped that quantifiable evidence may be gathered that supports the prey-dependent, ratio-dependent, or a hybrid mathematical ideology.

P604 **Terrestrial Ecology and Management**

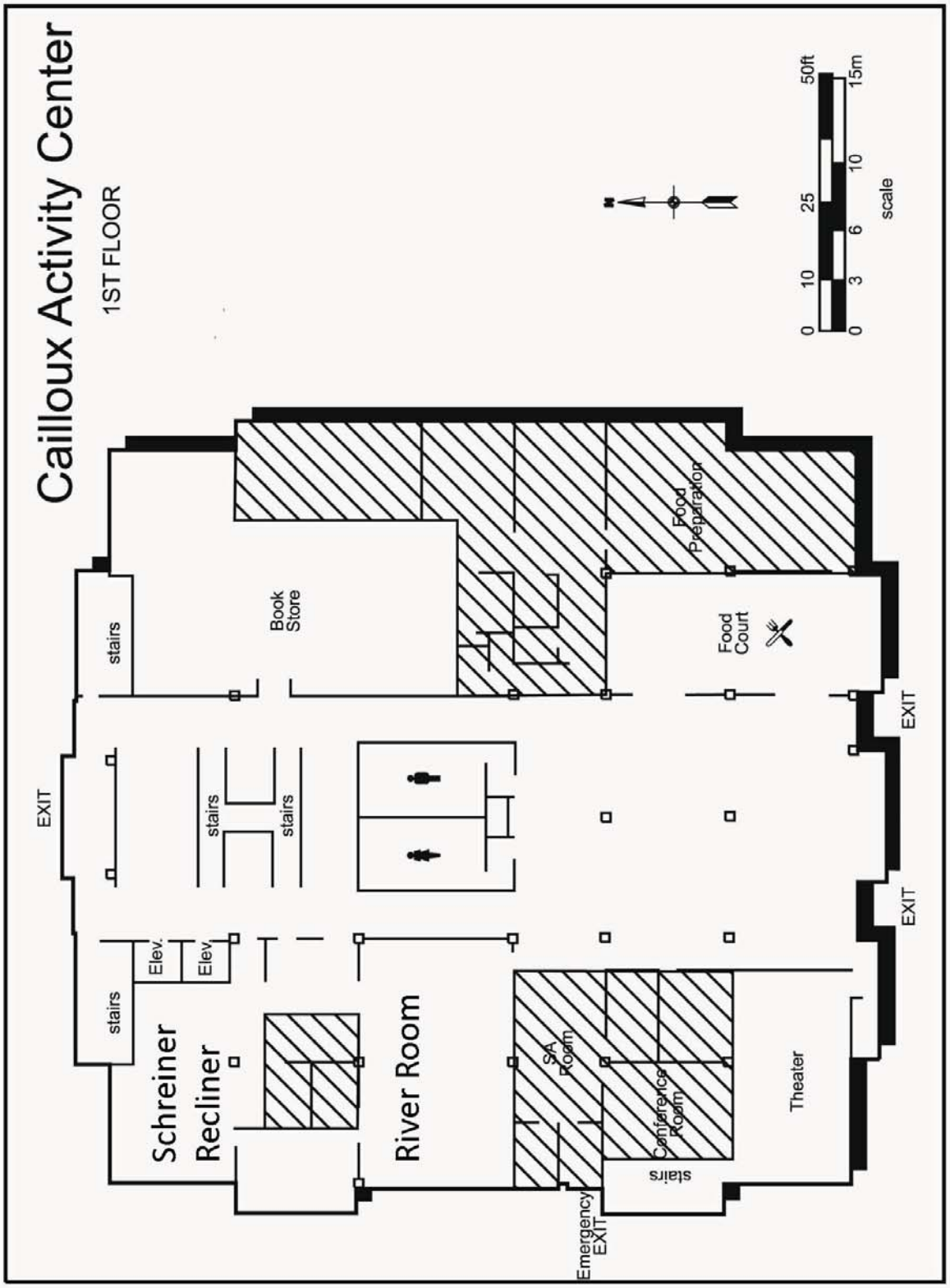
A comparison of the ectoparasitic fauna of *Peromyscus* and *Heteromys* genera between Presidio County, Texas and La Tigra and Cusuco National Park in Honduras

Lizbeth Marquez and Christopher Ritzi

One of the major deficiencies in mite ectoparasitism studies is the lack of specialization in identification of these organisms. They are therefore commonly overlooked in favor of their insect cousins, such as fleas and lice. Despite this problem, many studies have taken place in Mexico and South America as well as in the United States. More likely than not, ectoparasitic mites will occur in higher abundance and diversity in Neotropical areas. This could largely be driven by the latitudinal diversity gradient hypothesis that states that the closer you get to the equator, the more species are found. As such, it is deemed of interest to examine communities from different ecological and geographic regions and examine differences and similarities observed, in particular those from La Tigra and Cusuco National Parks in Honduras and Presidio County, Texas.

Schreiner University Campus Layout

1 Cailloux Student Center: banquet, vendors, social, posters;
2 Weir Academic Building: meetings;
3. Moody Science Building: meetings


Cailloux Activity Center
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Book Store
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EXIT
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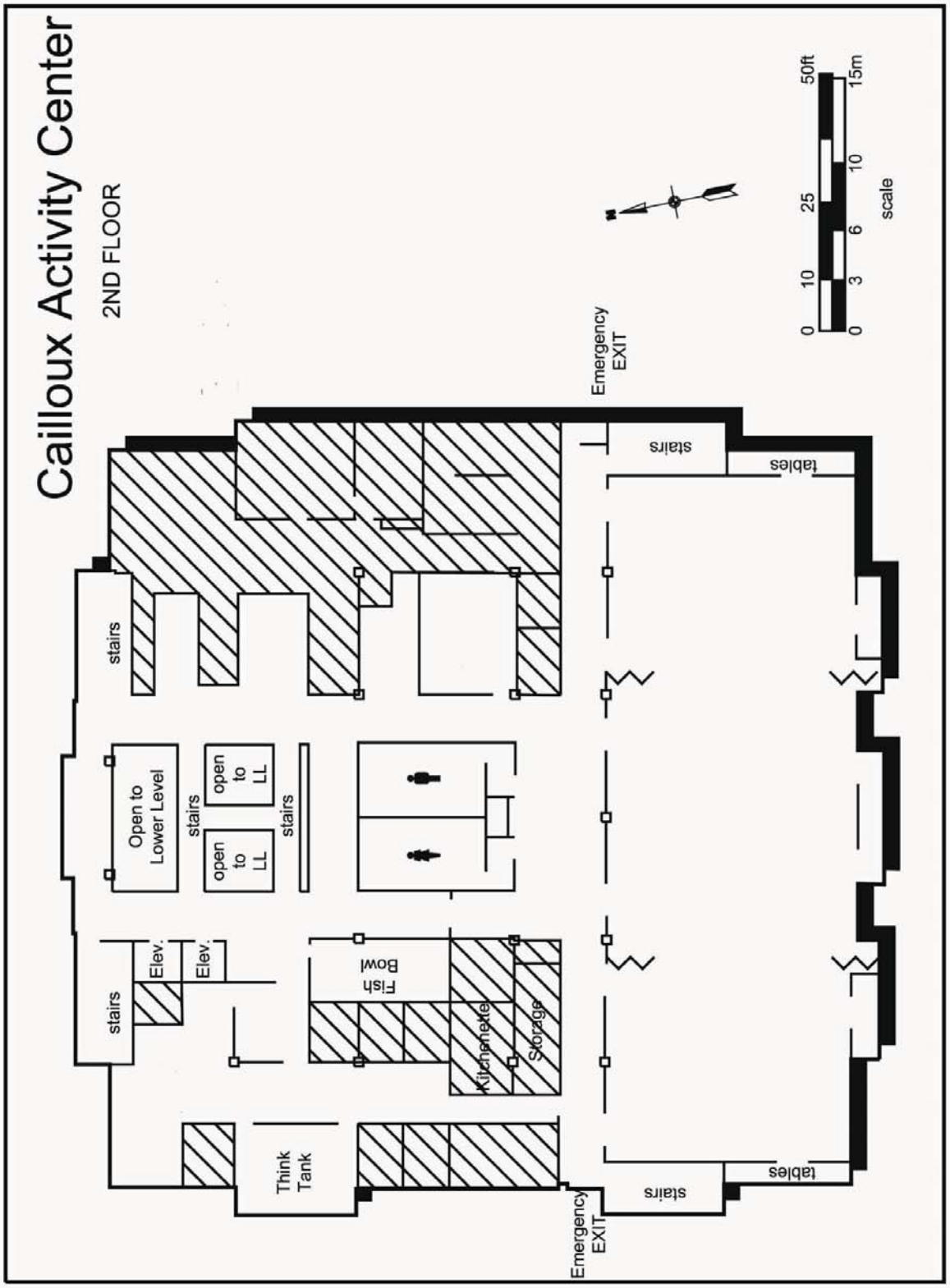
Recliner
River Room
SA Room
Conference Room
stairs
Theater
Emergency EXIT


Cailloux Activity Center
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0 3 6 10 15m
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stairs
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tables
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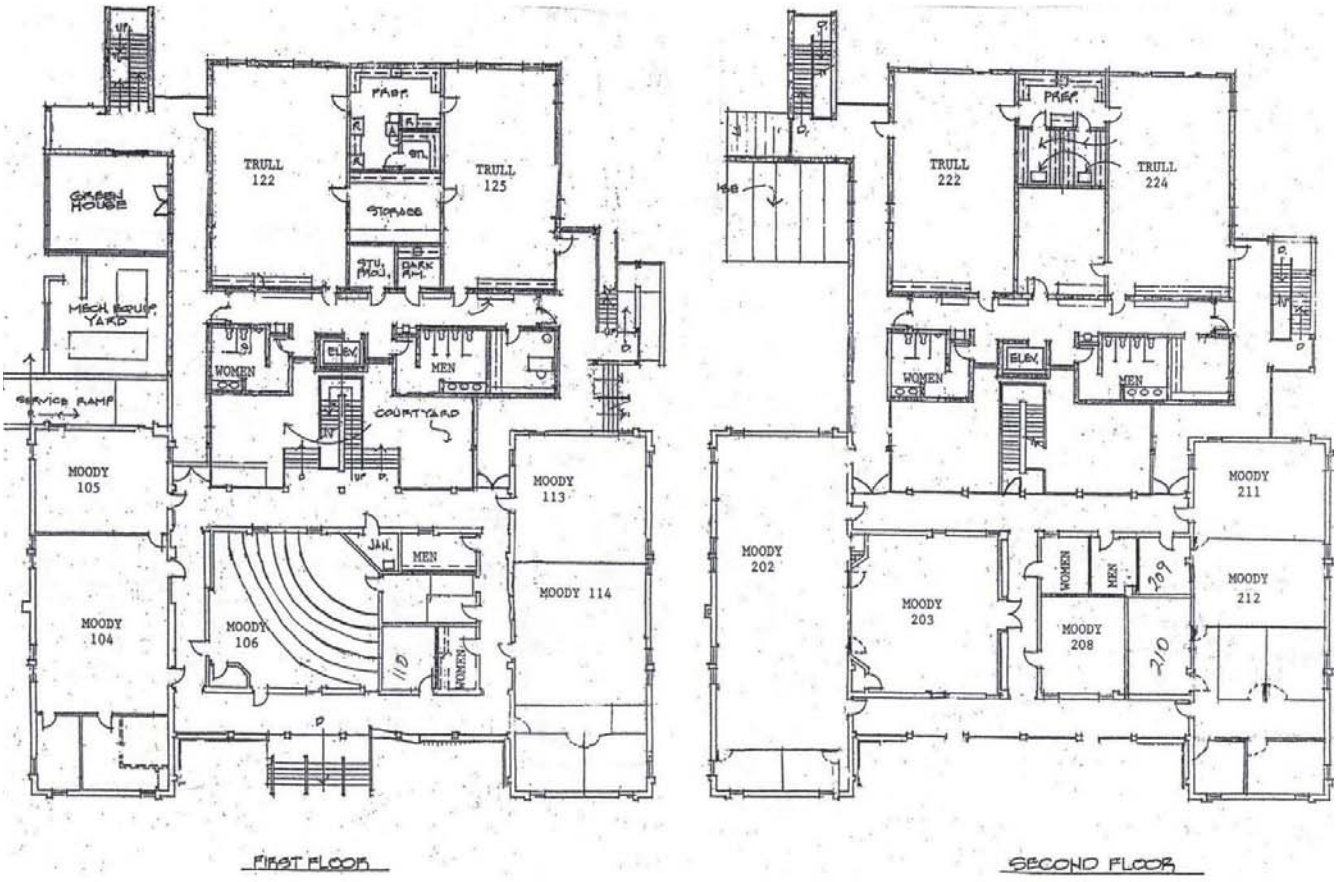
Elev.
Elev.
Fish Bowl
Kitchenette
Storage
Think Tank
Emergency EXIT


TRULL 122
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PASS.
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DARK RM.
GREEN HOUSE
MECH. EQUIP. YARD
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ELEV.
MEN
COURTYARD
MOODY 105
MOODY 104
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MOODY 113
MOODY 114
JAN.
MEN
WOMEN
110
FIRST FLOOR
TRULL 222
TRULL 224
PASS.
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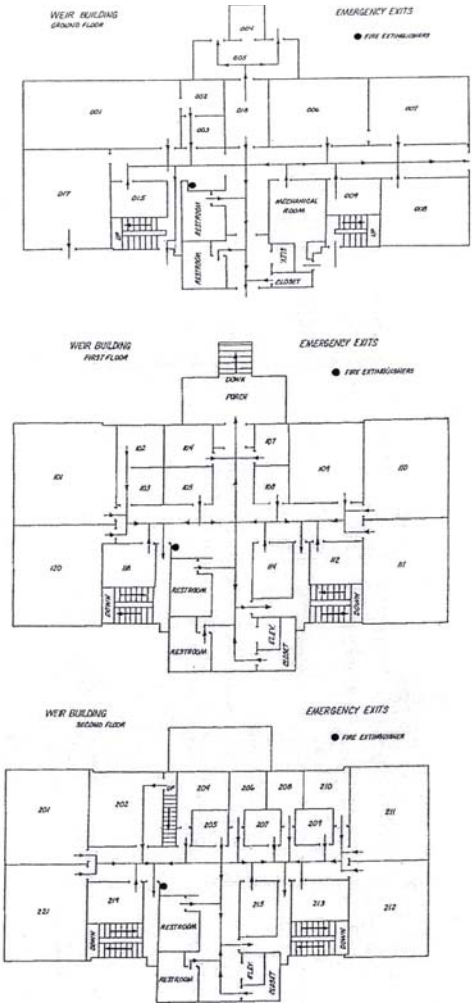
SECOND FLOOR


WEIR BUILDING
GROUND FLOOR
EMERGENCY EXITS
FIRE EXTINGUISHERS
MECHANICAL ROOM
RESTROOM
RESTROOM
CLOSET
WEIR BUILDING
FIRST FLOOR
EMERGENCY EXITS
FIRE EXTINGUISHERS
DOWN
PORCH
RESTROOM
RESTROOM
CLOSET
DOWN
DOWN
WEIR BUILDING
SECOND FLOOR
EMERGENCY EXITS
FIRE EXTINGUISHER
RESTROOM
RESTROOM
CLOSET
DOWN
DOWN

Notes