123rd Annual Meeting
of the
Texas Academy of Science

TAS
Texas Academy of Science

February 28th – 29th, 2020

Stephen F. Austin State University
1936 North St.
Nacogdoches, Texas

Official Program

Abbreviated Program Schedule

	Friday February 28th	
08:00 a.m. – 11:30 a.m.	TAS Board of Directors Meeting	Cole STEM 401/402
10:00 a.m. – 05:00 p.m.	Meeting Registration	Cole STEM Atrium
11:40 a.m. – 12:40 p.m.	Section Chairs Pre-Session Lunch Meeting	Cole STEM 401/402
01:00 p.m. – 03:00 p.m.	Oral Paper Sessions 1	Bush Mathematics & Miller Science Bldgs.
03:00 p.m. – 03:30 p.m.	Coffee Break	Cole STEM Atrium
03:30 p.m. – 04:40 p.m.	Tamaulipan thornscrub and Trans-Pecos Symposium	Kennedy Auditorium
05:00 p.m. – 06:30 p.m.	Planetarium Show	Cole STEM Planetarium
05:00 p.m. – 06:30 p.m.	Judging Poster Session 1	Cole STEM Hallways
06:30 p.m. – 08:00 p.m.	Planetarium Show – Repeat Showing	Cole STEM Planetarium
06:30 p.m. – 08:00 p.m.	Judging Poster Session 2	Cole STEM Hallways

	Saturday February 29th	
07:00 a.m. – 10:00 a.m.	Meeting Registration	Cole STEM Atrium
07:00 a.m. – 08:00 a.m.	Past Presidents Breakfast	Cole STEM 401/402
08:00 a.m. – 10:00 a.m.	Oral Paper Sessions 2	Bush Mathematics & Miller Science Bldgs.
10:00 a.m. – 10:30 a.m.	Coffee Break	Cole STEM Atrium
10:30 a.m. – 12:30 p.m.	Oral Paper Sessions 3	Bush Mathematics & Miller Science Bldgs.
12:30 p.m. – 01:45 p.m.	Lunch	Cole STEM Atrium
01:45 p.m. – 02:00 p.m.	Business Meeting	Kennedy Auditorium
02:00 p.m. – 03:40 p.m.	Graduate Student Oral Presentation Competition	Kennedy Auditorium
03:40 p.m. – 04:00 p.m.	Coffee Break	Cole STEM Atrium
04:00 p.m. – 05:00 p.m.	Section Chair Post-Session Meeting	Cole STEM 401/402
04:00 p.m. – 05:00 p.m.	Science Jeopardy	Kennedy Auditorium
05:00 p.m. – 05:30 p.m.	Outstanding Texas Educator Award and Lecture	Kennedy Auditorium
05:30 p.m. – 06:00 p.m.	Distinguished Texas Scientist Award and Lecture	Kennedy Auditorium
06:30 p.m. – 07:30 p.m.	Reception	Expo Center
07:30 p.m. – 09:30 p.m.	Awards Banquet	Expo Center

	Sunday March 1st	
08:00 a.m. – 01:00 p.m.	Geology of Nacogdoches Field Trip	Meet at the Stone Fort Museum

Presenter Key for Poster and Paper Abstracts
N Non-student
H High School student
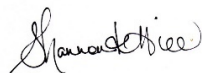U Undergraduate student
G Graduate student

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Welcome and Acknowledgements from the Program Chair

Welcome to the 123rd meeting of the Texas Academy of Science! We are excited to bring our meeting to the beautiful campus of Stephen F. Austin State University in Nacogdoches, Texas. Please join me in thanking the Stephen F. Austin State University community and the city of Nacogdoches for graciously hosting our event.

We would not be able to hold this meeting without the exemplary work of numerous volunteers. Many thanks to Dr. Alyx Frantzen, who has the formidable task of being the local host, a section chair and the current president of the Academy. The Section Chairs and Vice Chairs have done an amazing job of reviewing abstracts and working with our many authors to produce exciting and informative oral presentation and poster sessions. I would like to send a special thanks to the Academy's Coordinator of Information Technology, Dr. Ricardo Bernal, whose input was needed during virtually every step of this process. His technical knowledge, prompt replies and unfailing good humor were an essential part of planning this meeting!

Highlights of this meeting include the symposium discussing the unique ecology of the Trans-Pecos and Tamaulipan Thornscrub ecoregions, the Graduate Student Oral Presentation Competition, the return of the popular Science Jeopardy Competition and the presentations from this year's Distinguished Texas Scientist and Outstanding Texas Educator. We look forward to the exciting events of this year's meeting, learning about the current research being conducted through the state and socializing with old friends and new.

Shannon K. Hill, President Elect of the Texas Academy of Science

About the Texas Academy of Science

History

First founded by teachers as the Academy of Science in Texas in 1880, the organization as we know it now emerged around 1929 and included a physicist, a botanist, a mathematician and two biologists as its founding members. Now, TAS publishes a peer-reviewed journal (The Texas Journal of Science since 1949), conducts an annual meeting that highlights research across 17 sections across the sciences, provides substantial funding opportunities for students (~$25,000 awarded annually) and facilitates expert testimony on policy issues related to STEM or science education. TAS membership approaches 600 individuals, with a large portion of the membership as students.

Mission

As part of its overall mission, the Texas Academy of Science promotes scientific research in Texas colleges and universities, encourages research as a part of student learning and enhances the professional development of its professional and student members. TAS possesses a complex, intriguing and long-standing educational mission.

Strategic Planning

The Texas Academy of Science (TAS) Board of Directors approved a vision for a 5-year Strategic Plan: "to increase the visibility and effectiveness of TAS in promoting strong science in Texas." As part of that initiative, the Academy seeks to reach out to foundations and organizations that support and benefit the Texas science community. We believe that a number of opportunities exist for strategic partnerships that could bolster the impact of organizations that raise the profile of science in Texas. Our ultimate goal will be to make TAS the premier state academy in the United States; however, this cannot be accomplished without funding from both individuals and corporations. It should also be noted that 100% of the contributions given to TAS for student awards goes directly to the award.

THE TEXAS ACADEMY OF SCIENCE
INCORPORATED IN 1929; AFFILIATED WITH THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Welcome and Acknowledgements from the Academy President

Welcome to the 123rd Annual Meeting of the Texas Academy of Science. I am so pleased to welcome you all to the Stephen F. Austin State University campus in Nacogdoches, Texas. I have been honored to spend the last year as the president of this organization and feel strongly about the role of the TAS. It is important that we have an organization that recognizes and supports student research in all disciplines of STEM. For me, involvement in TAS mirrors closely what I do in my job every day. We use this conference as an opportunity to mentor our future leaders and encourage their involvement in our beloved fields of expertise. After our conferences, I always feel confident in the direction TAS is going and the impact our organization has. We must not, however, lose sight of where TAS has been and what we want to achieve. We need to continue working to expand our numbers, both in professional and student memberships. While I was working on organizing this meeting, it became clear that if our numbers increase ever so slightly, we would need to have a three day meeting. While logistically this could present problems, what great problems to have!

A new addition to the program this year is the symposium being held on Friday afternoon. We are pleased to have Ivana Mali, Eastern New Mexico University, Martin Terry, Sul Ross State University, and John Karges, The Nature Conservancy, speaking on the ecology/conservation of the Trans-Pecos and Tamaulipan Thornscrub. After a successful round of Jeopardy at the last meeting, I am pleased the Student Board members will be hosting this activity prior to the plenary talks. Get a team together and come and join in the fun! Our meeting this year will continue the tradition of awarding excellence in research and education. I am so pleased to award the Texas Distinguished Scientist award to Dr. George Perry, Professor of Chemistry and Biology at The University of Texas at San Antonio, and the Outstanding Texas Educator to Katherine Fincher from Amarillo High School. I look forward to their presentations on Saturday afternoon. Please take the time to join us at these events and congratulate our awardees.

The Texas Academy of Science is an organization completely run by the efforts of volunteers. It would not exist without you and we rely on our membership to make it strong. President Elect, Shannon Hill, has put in MANY hours on putting together this program and we thank her. I also would like to take this time to recognize the incoming and outgoing members of the Board. We thank you all so much for your willingness to serve in these position; TAS would be nothing without such strong members.

I welcome you all to SFA and reflect on a challenge given by Dr. Franklin L. Yoakum, a founding member of the Academy. "The president wishes it announced to the public, that through the various branches of the Academy of Sciences of Texas can be furnished to enquirers the true technical name, Natural History, and use of every specimen of nature living or dead."
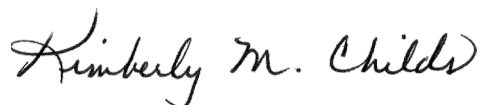
Axe 'em!

Alyx S. Frantzen

Alyx S. Frantzen
President, Texas Academy of Science

Welcome from the Dean of Sciences and Mathematics at Stephen F. Austin State University

Welcome to Stephen F. Austin State University and to the College of Sciences and Mathematics! It is a great honor to host the 123rd annual meeting of the Texas Academy of Science. I look forward to visiting with you while you are here.

As institutions of higher education we are all engaged in a broad-based STEM initiative that is critical to the well-being of our nation. Together, we are challenged to prepare students to enter STEM careers. Through high-leverage programs, unique research experiences and exciting internship opportunities, we strive to empower the next generation of STEM professionals. It is exciting to share our experiences with others as we network throughout the meeting events.

Enjoy your time here with us in Nacogdoches!

Kimberly M. Childs

Dean, College of Sciences and Mathematics
Stephen F. Austin State University

About Nacogdoches, Texas
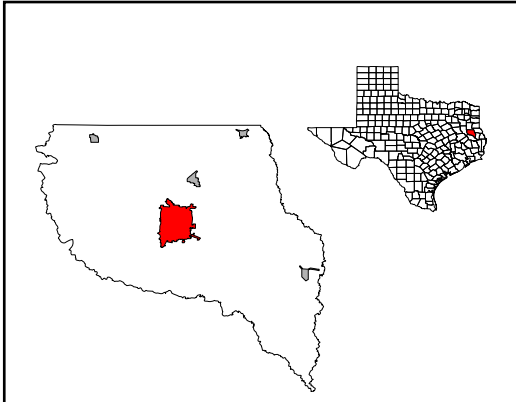
The city of Nacogdoches is the seat of Nacogdoches County and is considered to be the oldest town in Texas. It was founded by Don Antonio Gil Y'Barbo in 1779, incorporated as a town in 1837 and incorporated as a city in 1929. Named for a local Caddo tribe called the Nacogdoche, Nacogdoches has a long-standing history of commerce and trade.

Nestled in the East Texas Pineywoods (ecoregion 1 on Texas Parks and Wildlife map to the right), Nacogdoches lies 150 miles north of Port Arthur and 60 miles west of the Sabine River, which demarcates the border between Texas and Louisiana. Nacogdoches enjoys some of the largest quantities of precipitation in the state, which supports the region's lush vegetation. For example, the largest azalea garden in Texas, the Ruby M. Mize Azalea Garden, located on the campus of Stephen F. Austin State University, contains a stunning 7,000 azaleas, 200 camellias and an impressive number of Japanese maple varieties. The azalea garden is just one part of the Mast Arboretum, containing 20 themed gardens, including butterfly, herb, and holly gardens, a pitcher plant bog and a beehive exhibit.
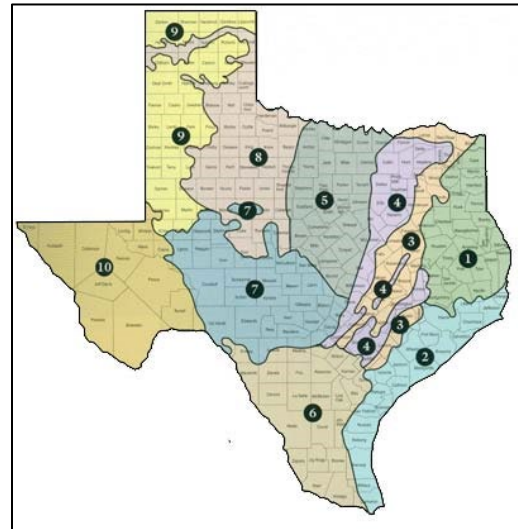
Nacogdoches has many sites of architectural interest, such as the Millard's Crossing Historic Village, a living history site with restored Victorian homes, log cabins and a red train caboose. The Old Stone Fort Museum is a 1936 replica of a building by Don Antonio Gil Y'Barbo and exhibits focus on regional history.

As of the 2010 census, Nacogdoches had a population of 32,996 people. Through its long history, the city has had an impressive list of august residents and visitors, such as Sam Houston, Thomas Jefferson Rusk, David Crockett and more recently, the Marx Brothers and Willie Nelson. Nacogdoches is not only renowned for its natural beauty and historical architecture, it was also nominated as one of the 'Friendliest Towns in America' by USA Today and Rand McNally.

About Stephen F. Austin State University

Founded in 1923 as a teacher's college, Stephen F. Austin State University offers over 120 areas of study, including upwards of 80 undergraduate majors, 60 graduate degrees and three doctorial programs. The Arthur Temple College of Forestry and Agriculture is one of only two schools of forestry in Texas. The university also has an astronomy observatory, a 642-acre agricultural research center, a 2,650-acre experimental forest, a 25-acre forestry field station on the Sam Rayburn Reservoir and is home to the National Center for Pharmaceutical Crops.

With nearly 13,000 students and 519 full time faculty, SFASU provides a dynamic academic environment and thriving community. In recognition of the economic, cultural and ecological importance of the national forests that surround the campus, SFASU adopted the lumberjack mascot in 1932. Rich in tradition, SFASU students participate in many campus events, such as Lumberjack Day, the homecoming bonfire and class ring ceremony, the Big Dip.

Many notable SFASU alumni have made outstanding contributions in science, government and art. Joseph W. Kennedy (class of 1935) co-discovered Plutonium in 1940 as the head of the Chemistry and Metallurgy Division at the Manhattan Project's Los Alamos laboratory. Nancy Dickey (class of 1972) was the first female to be elected president of the American Medical Association and currently serves as president of Texas A&M University's Health Science Center. Dr. Virginia Burkett (class of 1997) is the chief scientist for climate and land-use change for the U.S. Geological Survey and was among the Nobel Prize-winning authors of a series of climate change assessment reports for the United Nations. Bill Owens (class of 1973) was elected and served as the governor of Colorado from 1999 through 2007. Songwriter Will Jennings (classes of 1965 and 1967) won the 1983 Academy Award and Golden Globe for his song "Up Where We Belong" and in 1997, he won an Academy Award, Golden Globe and Grammy for "My Heart Will Go On," from Titanic.

Local Eateries

Restaurants	Fast Food	Other
Barkeep's Eatery and Taps 3308 North St (936) 305-5344	**Chicken Express** 1614 N University Dr (936) 559-0077	**Fredonia Brewery** 138 N Mound St (936) 305-5125
Bottlecap Alley Icehouse Grill 3203 North St (936) 559-0000	**Chick-fil-A** 2804 North St (936) 462-8681	**Naca Valley Vineyard** 9897 FM 1878 (936) 615-6432
Butcher Boy's 603 North St (936) 560-1137	**Chipotle Mexican Grill** 2111 North St (936) 559-5393	**Red House Winery** 108 Pilar St (936) 305-5068
Casa Tomas Mexican Restaurant 1514 North St (936) 560-2403	**Jimmy John's** 2023 North St (936) 462-1648	
Cotton Patch Café 3117 North St (936) 569-6926	**Knuckle Sandwich** 109 E College St (936) 205-3018	
Dolli's Dinner 116 S Pecan St (936) 305-5007	**Panda Express** 1602 North St (936) 462-8808	
El Ranchero 123 King St (936) 569-2256	**Raising Cane's** 1831 North St (936) 569-1700	
Fredonia Hotel, 1st City Café 200 N Fredonia St (936) 564-1234	**Schlotzsky's** 2608 North St (936) 564-2867	
Lanana Creek Icehouse 109 Wettermark St (936) 462-9550	**Subway** 2721 North St (936) 559-8910	
Maklemore's Ale-House and Bistro 2304 North St (936) 205-9183	**Taco Bueno** 1821 North St (936) 569-1073	
Nac Burger 3205 N University Dr (936) 205-9835	**Taco Casa** 1133 N University Dr (936) 305-5353	
Napolis Italian Restaurant 2119 North St (936) 560-2002		
Pupuseria El Pampero 721 N University Dr (936) 205-5999		
Zoukis Mediterranean and Pepperjacks Serious Burritos 1220 North St 6) 205-3166		

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THE TEXAS JOURNAL OF SCIENCE

Call for Manuscripts

The Texas Journal of Science is a publication of The Texas Academy of Science and is sent to most members and all subscribers. The goal of the Journal is the timely dissemination of research results and scientific information to the scientific community. The Journal is received by TAS members, educational institutions throughout the USA, and international institutional subscribers. Scholarly papers reporting original research results in any field of science, technology or science education will be considered for publication.

The Journal is available online where accepted papers are published immediately and an annual print volume is mailed to TAS members at the end of the year. Old issues (1949-2010) are also available online for free from the Biodiversity Heritage Library. A link to old issues is available on www.texasacademyofscience.org

If all authors are TAS members at the time an article is submitted and published, page charges will be waived for the manuscript. We are actively seeking quality manuscripts so visit www.texasacademyofscience.org and check out the Author Guidelines to submit your manuscript.

Meeting Notes and Poster Guidelines

Registration: Meeting registration will be held in the Cole STEM Building's Atrium and will be open from 10:00 a.m. to 5:00 p.m. Friday February 28th and again on Saturday February 29th from 7 a.m. until 10 a.m.

Parking: Parking is allowed anywhere on the Stephen F. Austin State University campus except specifically reserved or handicapped sites.

Posters: Posters should be set-up in the hallways of the Cole STEM Building no later than 4:30 p.m. on Friday February 28th. Since we anticipate and encourage poster viewing outside of the judging time periods, please keep your poster up until Saturday at 1:30 p.m.

Judging Poster Session 1: Will be between 5:00 p.m. and 6:30 p.m. on Friday for the following sections:

Anthropology; Biomedical Sciences, Cell & Molecular Biology; Conservation Ecology; Freshwater Science; Geoscience; Neuroscience; Terrestrial Ecology & Management.

Judging Poster Session 2: Will be between 6:30 p.m. and 8:00 p.m. for the following sections:

Chemistry & Biochemistry; General Science; Marine; Mathematics & Computer Science; Physics & Engineering; Plant Biology; STEM Education; Systematics & Evolutionary Biology.

Planetarium Show: The planetarium show will run twice Friday evening; the first showing will start at 5:00 p.m. and will re-run at 6:30 p.m. This will allow for everyone to view the show, including those who are participating in the poster sessions.

Saturday Lunch: Lunch will be served Saturday from 12:30 p.m. to 1:45 p.m. in the Cole STEM Building Atrium.

Saturday Reception and Banquet: The Reception and Awards Banquet will be held at the Nacogdoches County Exposition & Civic Center 3805 NW Stallings Drive Nacogdoches, Texas 75964, (936) 564-0849.

2020 Outstand Texas Educator

Mrs. Kay Fincher
Amarillo High School, Amarillo, Texas

Mrs. Kay Fincher earned a bachelor's degree in biology with a minor in chemistry from West Texas A & M University in Canyon, Texas way back in 1986. After teaching middle school science for 10 years she began teaching physics at Amarillo High School. Unhappy with the quality of her physics teaching, she attended summer workshops at Arizona State University to learn a research-based student-centered teaching method known as Physics Modeling Instruction. In 2005 she earned her master's degree in physics education from Arizona State.

During her last summer in Arizona, she and several other teachers founded the American Modeling Teachers Association to promote the Modeling Instruction teaching method. Mrs. Fincher leads Modeling Instruction Workshops around the state and presents at national, state, and regional conferences in addition to being an AP Physics reader. She is a member of the Amarillo ISD's science curriculum cadre and is the lead physics teacher in the district.

For her excellence in and dedication to science education, Mrs. Fincher was chosen as a state finalist for the Presidential Awards for Excellence in Math and Science Teaching in 2017 and 2019.

Fincher currently teaches AP Physics 1 and 2 at Amarillo High School in Amarillo, Texas. Using the Modeling Instruction teaching method, she allows her students to construct their understanding of physics principles by analyzing experimental data and engaging in evidence-based argument. In the words of one of her former students, "Mrs. Fincher creates, in her classroom, the perfect environment for scientific learning. We were always encouraged to find, for ourselves, what was true. Through hands on experiments, group work, or lively debate, we were always free to learn effectively in our own style. And, at any time we were stuck or needed a little extra information, she would help just enough to point us to the next step."

2020 Distinguished Texas Scientist

Dr. George Perry
University of Texas at San Antonio

George Perry is Professor of Biology and Chemistry, Semmes Foundation Distinguished University Chair in Neurobiology, and former Dean of Sciences at The University of Texas at San Antonio. Perry has studied Alzheimer's disease since 1982 and was the first to discover that oxidative stress is a key feature of this and related neurodegenerative diseases. His studies identified oxidative damage, its source from metabolic/mitochondria failure and catalysis by iron and copper. This work led to a novel interpretation of the role of amyloid—that instead of causing Alzheimer's disease, it is a protective antioxidant response, and the reason all the amyloid-based therapies have failed.

Perry received his Bachelor of Arts degree in zoology with high honors from University of California, Santa Barbara. After graduation, he headed to Scripps Institution of Oceanography and obtained his Ph.D. in marine biology under David Epel in 1979. He then received a postdoctoral fellowship in the Department of Cell Biology in the laboratories of Drs. Bill Brinkley, Anthony Means and Joseph Bryan at Baylor College of Medicine where he laid the foundation for his observations of abnormalities in cell structures.

He is distinguished as one of the top Alzheimer's disease researchers with over 1000 publications, one of the top 100 most-cited scientists in neuroscience and behavior and one of the top 25 scientists in free radical research.

Perry has been cited over 92,000 times and is recognized as an ISI highly cited researcher (H=153). Perry is editor-in-chief for the Journal of Alzheimer's Disease, the most cited journal in the field. He is a fellow of the American Association for the Advancement of Sciences, Texas Academy of Sciences, and the Microscopy Society of America. He is past-president of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science and past-president of the American Association of Neuropathologists. He was awarded the Society for the Advancement of Chicanos and Native American in the Sciences' (SACNAS) Distinguished Professional Mentor Award, the Senior Investigator Award of the International College of Geriatric Psychoneuropharmacology (ICGP), Martin Goland Award of the Alamo Chapter of Sigma Xi, and Senior Fulbright Scholar. He was elected a Foreign Corresponding Member of the Academy of Sciences of Lisbon, Foreign Correspondent Member of the Spanish Royal Academy of Sciences, Corresponding Member of the Mexican Academy of Sciences, and Member of the Dana Alliance for Brain Initiatives. For over a decade, Perry hosted the Texas Science and Engineering Fair. He has mentored over a hundred students and fellows in research.

Francisco Gonzalez-Lima

2020 Vice President

Dr. Francisco Gonzalez-Lima and his trainees are leading neuroscientists doing research on the relationship between brain energy metabolism, learning and memory, and neurobehavioral disorders. He holds the George I. Sanchez Centennial Professorship at the University of Texas at Austin, where he is professor in the Departments of Psychology, Pharmacology and Toxicology, and Psychiatry, and the Institute for Neuroscience. He graduated with honors from Tulane University, New Orleans, with B.S. (Biology) and B.A. (Psychology) degrees, and obtained his Ph.D. (Anatomy and Neurobiology) from the University of Puerto Rico School of Medicine, which honored him with a Distinguished Alumnus Award. He completed his postdoctoral training (Behavioral Neuroscience) at the Technical University of Darmstadt, Germany, as an Alexander von Humboldt Research Fellow. Dr. Gonzalez-Lima has been Fellow, Founding Chair of the Neuroscience Section, Distinguished Texas Scientist Award winner and Academic Director of the Texas Academy of Science. He is an elected Fellow and USA Councilor of the International Behavioral Neuroscience Society; has been a visiting neuroscientist and has delivered invited lectures research at universities around the world, and served on national and international scientific advisory boards (including the US National Academy of Science Committee to the International Brain Research Organization). His brain research has been funded for over 30 years and has contributed over 400 scientific publications in peer-reviewed journals, conference proceedings, chapters and books.

As TAS president, I seek to use the visibility of this position to advance scientific research and education in Texas. First, I will work to increase recognition and participation of more research-intensive universities in TAS meetings and activities, in particular from the UT system and Texas A&M system. Second, I will seek to bring together Texas scientists, educators and students of diverse cultural and ethnic backgrounds to facilitate integration of science research, provide professional development opportunities, and promote science education and public information. Finally, I will advocate to policymakers and private donors for the support of TAS and its mission of science progress for the benefit of society.

Milka O. Montes

2020 – 2023 Academic Director

Dr. Milka O. Montes is an Associate Professor and Chair of the Department of Chemistry at the University of Texas Permian Basin located in Odessa, Texas. She is an analytical and environmental chemist by training and her research revolves around the synthesis, characterization, and applications of noble metal nanoparticles as well as development of produced water filtration techniques. She obtained her Chemistry Doctoral Degree from the University of Texas at El Paso in 2010, and her post-doctoral work was on the implications of nanomaterials on aquatic environments from the University of California Santa Barbara.

Dr. Montes is highly engaged in research activities and professional organizations. She is a member of the Texas Academy of Science, American Chemical Society, Gamma Sigma Epsilon Xi Zeta Chemistry Honor Society, and SACNAS. She also serves as the Campus Director of the NSF-funded UT System LSAMP Program at UT Permian Basin, which allows participation of undergraduate students in their Summer Research Academy under STEM. As an active member of the Permian Basin Local Section of the American Chemical Society, she promotes undergraduate research in chemistry locally throughout Odessa and Midland, Texas. She is also a Board member of the Peer-Led Teaching Learning International Society, which promotes student learning by supporting practitioners and institutions.

She has a passion for higher education and research as well as developing leadership opportunities for students in science. Her vision for TAS is to promote the incorporation of research in the curriculum and to continue the enhancement of professional development opportunities for TAS members at large.

Enrique A. Reyes

2020 – 2023 Non-Academic Director

Dr. Enrique A. Reyes is a Scientific Advisor at Halliburton's Houston Technology Center in the Applied Sciences Research and Development group. Provide support to operations and Product Management as well as service lines in the areas of acidizing treatments, corrosion inhibition, and general stimulation chemicals. He began his career in 2007 at the Duncan Technology Center (Duncan, OK) before moving to the Houston, TX (USA) in 201X. During his career he has authored or co-authored 12 publications in the field of sandstone and carbonate acidizing, and holds 50 patents. Enrique's Chemistry Ph.D. from Purdue University (West Lafayette, IN) was conducted under Prof. D. Raftery in the field of inorganic photocatalysis, solid state materials analysis focusing on solid state nuclear magnetic resonance (SSNMR) spectroscopy. Prior to graduate school he attended the Univ. of Texas El Paso (B.S./M.S. Chemistry) working on organosilicon chemistry, and taught for two years in the Universidad Autonoma de Cuidad Juarez, MEX. Focusing on the area of stimulation chemicals, Enrique interests are in advancing chemical technologies and applications in the oilfield industry.

Relations and partnerships among Industry and Academia need to build the necessary bridges to communicate the benefits that both strive to achieve. I have been part of the academic and scientific endeavor as well as industrial developmental enterprise and of intra-collaborations which have exposed the challenges and opportunities to engage each other and collaborate, and should I have the opportunity and honor to participate in the Texas Academy of Science I would work towards this vision.
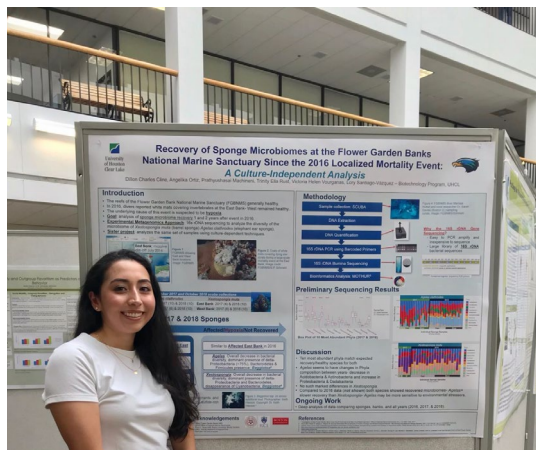
Angelika Ortiz

2020 – 2022 Student Director

This upcoming December, Angelika will graduate from the University of Houston-Clear Lake with a Bachelor of Science degree in Environmental Biology. Starting January 2020, Angelika will begin pursuing her master's degree in Environmental Management.

During her collegiate career, Angelika broadened her understanding of necessary field skills by taking several environmental courses, tutoring biology, gaining lab experience as a research assistant for Dr. Santiago-Vázquez, and interning at the Environmental Institute of Houston. Specific courses such as Ichthyology, Environmental Sampling and Analysis, and Field Biology solidified her interest in the area of environmental science. These classes taught Angelika how to identify common marine and freshwater organisms; animals and plants, as well as how to work professionally in the field alongside other colleagues.

The summer before her last year of college, Angelika worked at the University of Houston-Clear Lake's Student Success Center as a tutor. Throughout the summer, Angelika helped students accomplish personal academic goals by teaching individual and group sessions. In her senior year, Angelika was a research assistant in Dr. Santiago-Vázquez's lab for an ecology project, Gorgonian Coral and Sponge-Associated Microbial Communities. During her time as a lab assistant, Angelika obtained, identified, and processed samples using spreadsheets and databases. Being a lab assistant for a marine ecology project allowed her to practice methods she initially learned in the classroom and develop new aptitudes. In January 2019, Angelika began to intern for the Environmental Institute of Houston. Throughout her time as an intern, she worked part-time during the school semester and full-time during the summer. Angelika found that working for the Environmental Institute of Houston (EIH) gave her the opportunity to conduct field work and data assessment on a multitude of projects. Projects ranged from diverse graduate theses to water quality sampling for the city of Houston to national river/stream assessments. Angelika's experience at EIH was an also an opportunity she used to interact with various sampling equipment and sampling techniques. Angelika's time and experience during her undergraduate career has prepared her with the knowledge and skills needed to conduct environmental work individually and in a team setting.

Thomas Ready

Treasurer

Thomas Ready was born in Midland, Texas, in 1959. After spending ages 2-6 in Hobbs, New Mexico, the Ready family returned to Midland where Thomas attended Midland High school and played on the football team and met his future wife Suzanne Pomeroy. Tom later graduated with a B.S. in chemistry at the University of Texas at El Paso (UTEP) and further graduated with a Ph.D. in inorganic chemistry (with a "heavy dose" of polymer science) from the University of Massachusetts at Amherst.

Tom worked as a post-doctoral research scientist at North Dakota State University developing anti-fouling, silicone based marine coatings for Navy ships, a post that transitioned into a Research Scientist position at the NDSU Center for Nanoscience and Engineering where he worked for the next 6 years. However, in 2006, Tom moved back to Midland, Texas as Professor of Chemistry at Midland College. At Midland College Tom has mentored research projects on the synthesis of novel anti-biotics and measuring nutrient concentrations in the ocean above coral reefs. In addition to his teaching duties as a chemistry professor, Dr. Ready serves as the program chair for undergraduate research at Midland College. He also created the First Friday Science Seminar Series, was organizer/host for the West Texas STEM Conference in 2012 and 2015, and host/director for the 2018 Texas Academy of Science Meeting. Dr. Ready is the Midland College campus director for the Louis Stokes Alliance for Minority Participation in research (LSAMP) as part of the NSF funded UT-System LSAMP- Pathways program.

This program's mission is to increase the number professional STEM scientists from under-represented population groups. Each Summer, Tom leads UT-LSAMP students, on a multi-disciplinary, international research experience in Roatan, Honduras for coral reef ecosystems studies.

Suzanne and Tom have 3 cats that demand much attention. They love to watch football, particularly college football, and try to travel to one "big game" each year. They have travelled to Europe multiple times and have run the gauntlet of the English roundabouts - - - and survived.

Dr. Ready's vision for the Texas Academy of Science are three-fold:

1.) Increase Industry's awareness and participation in the Texas Academy of Science. This could lead to broadening the organization's membership base as well as increasing revenue for the TAS.

2.) Increase the Academy's presence in West Texas by developing participation of scientists/students in the organization and holding regional meetings of the Texas Academy of Science.

3.) Increasing the Texas Academy of Science's national presence through outreach to other state/regional academies and aggressive advertising.

Trans-Pecos and Tamaulipan Thornscrub Symposium
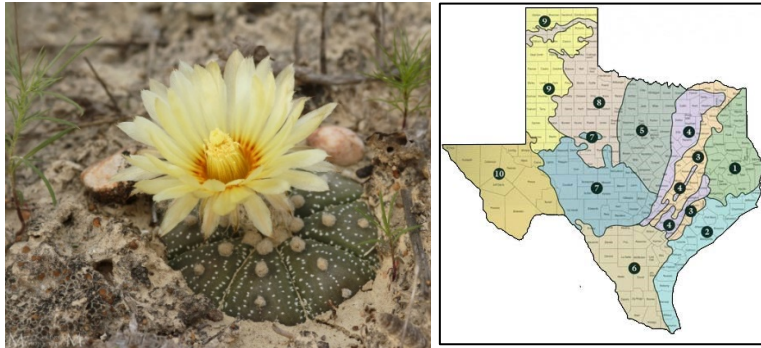
On Friday, February 28th, at 3:30 – 4:40 p.m. in the Kennedy Auditorium, the 123rd TAS annual meeting will hold a special symposium focusing on two ecoregions of Texas, the Trans-Pecos (ecoregion 10 on the Texas Parks and Wildlife map above) and the Tamaulipan Thornscrub (contains within ecoregion 6). This symposium will highlight the unique ecology of these regions and the challenges in their conservation. These challenges include profound urban development, hydrological changes, habitat fragmentation and the ecological ramifications of the proposed U.S.-Mexico border wall.

Trans-Pecos Texas: Eco-geography, biodiversity, conservation successes and challenges – John Karges, The Nature Conservancy, San Antonio, Texas

> The Trans-Pecos is the named geography of westernmost Texas characterized by aridlands of the northeastern Chihuahuan Desert Ecoregion and more wooded or forested mountains. Given the greatest elevation range in Texas and a broad range of soil types, it contains diverse habitats representative of its basin-and-range topography and physiography from lowland desert to Sky Island mountain ranges. The biodiversity of the Chihuahuan Desert is renowned for expanses of intact landscapes, endemic species of many groups of organisms including cactus, and rare aquatic plants and animals in and around places with surface water from springs and marshes to its very few perennial streams and rivers. The presentation will set the ecogeographic stage of the Trans-Pecos, highlight the biodiversity and habitats with some focus on mammals and fish, and summarize some of the more notable conservation achievements and challenges that exist or loom on the horizon.

Unusual yet iconic species of the Chihuahuan Desert - Ivana Mali, Eastern New Mexico University, Portales, NM and Michael R.J. Forstner, Texas State University, San Marcos, TX

> The Rio Grande cooter (Pseudemys gorzugi) is a large riverine turtle occurring in southeast New Mexico, west Texas, and northern Mexico. Until recently, Pseudemys gorzugi was one of the least studied species of freshwater turtles in the U.S. This species lives in an ecosystem where the scarcest resource is water, and faces many threats. The apparent loss of connectivity between the existing populations has prompted the U.S. Fish and Wildlife Service to review its status for potential federal protection under the U.S. Endangered Species Act. Here, I present significant progress we have made to understand this elusive species in my primary system of the Black River, New Mexico, while outlining still unanswered questions and future challenges for its conservation. I will focus on various aspects of P. gorzugi ecology, including diet, reproduction, movement, habitat requirements, and distribution. I then contrast the population demographics obtained from New Mexico locations with recently surveyed P. gorzugi in Texas. The comparative analyses uncovered fundamental differences in demographics and ecology of these two populations which opens doors for further testing what underlying causative factors create the disparity between sampled locations in New Mexico and Texas. Overall, this presentation will highlight the challenges of inhabiting one of the most anthropogenically compromised river systems in the U.S., using the Rio Grande cooter as a key indicator of habitat connectivity and its importance.

Trans-Pecos and Tamaulipan Thornscrub Symposium (cont.)

Cactus Floras of the Trans-Pecos and the Tamaulipan Thornscrub and What can be Deduced from the Similarities and Differences in Their Distributions – Dr. Martin Terry, President, Cactus Conservation Institute, Sul Ross State University, Alpine, Texas and Peter Berresford, Deputy Editor, British Cactus & Succulent Society

The westernmost ecological region of Texas, known as the Trans-Pecos, stretches from the El Paso area east to the Pecos River, and contains the natural habitats of some 105 taxa (species or subspecies) of cacti. Following the Rio Grande from the southeast corner of the Trans-Pecos (Val Verde County), southward through Kinney, Maverick and Dimmit Counties, one arrives in Webb County (of which Laredo is the County Seat). As one continues southward down the Rio Grande along the western edge of Webb County, subtle changes are noted in what remains of the brushy flora (where it has not yet been root-plowed or expunged for development), such that southern Webb County, essentially all of Zapata County and most of Starr County along the Rio Grande, as well as the eastern half of adjacent Jim Hogg County (which straddles the Bordas Escarpment immediately to the east) are still clearly recognisable as comprising part of the ecological region known as the Tamaulipan Thornscrub, which contains the natural habitats of at least 31 taxa of cacti. This paper compares and contrasts the cactus floras of the Trans-Pecos and the Tamaulipan Thornscrub, and offers some tentative explanations of the differences between these two floras.

Graduate Student Competition

A single session will be held, Saturday February 29th, 2:00 – 3:40 p.m., in the Kennedy Auditorium without any conflicting sessions, thereby enabling maximum participation. The participants are:

Big jumps or little steps: Fighting gerrymandering with random walks - Shawn Michel-Alexander Brody, Tarleton State University

> Courts at all levels are struggling with the increasingly pressing and complex issue of political gerrymandering. Deadlines for the post-2020 census redistricting are quickly approaching. At the heart of our difficulties to fairly divide ourselves in voting district lies a math problem – how do we measure fairness? How can we use that measure to draw fair district boundaries? Our project is part of nationwide collaboration of mathematicians, demographers, lawyers, mapmakers, political leaders, and citizens attempting to develop tools for this purpose. We will survey Markov Chain Monte Carlo (MCMC) methods used successfully in the PA Supreme Court case, work to make MCMC more widely available via the Python package GerryChain, and a recent improvement to MCMC called recombination. We will also discuss several commonly used compactness metrics and present a new idea called transit time compactness that aims to measure cohesiveness of people, not just land.

An ex situ evaluation of grasses (Poaceae) for management of roadside runoff in the Edwards Aquifer recharge zone - Sarah Gorton, The University of Texas at San Antonio

> Excess nitrates and phosphates in stormwater runoff along roadways can be detrimental to ecological processes and raise the costs of treating groundwater pumped by water utilities. Given the number of sensitive species present in the Edwards Aquifer, it is important to regulate and remediate potential sources of nitrates and phosphates before they enter the recharge zone. Understanding native plant uptake of nitrates and phosphates can help inform decision-makers about plant selection when revegetating post-construction, particularly along roadsides. In this study, the seeds of 13 native and 2 non-native species of grasses were potted in a commercial purchased potting soil and monitored for germination over two months. Germination percentage and seedling growth rates were monitored weekly. At 2 months, each grass species was harvested, separated by roots and shoots, oven-dried, and analyzed for dry weight biomass, relative growth rate, and root and shoot nitrate and phosphate concentrations. Based on the results of this study, five native grass species will be further evaluated in and ex situ for nitrates, phosphates, and heavy metals during the spring of 2020. This presentation will reflect which native grasses were most efficient in the mean uptake of nitrates and phosphorus from the soils and the ratio of N and P uptake to biomass.

Being Nose-y: Investigating the influences of climate and energetics on human nasal anatomy - Alexa P. Kelly, University of North Texas Health Science Center

> Narrower nasal airways enhance inspiratory air-conditioning in cold-dry climates. Yet, cold-dry environments are also metabolically expensive, demanding greater oxygen intake than tropical environments. Thus, it has been hypothesized that climate-mediated nasal narrowing may necessitate a compensatory increase in nasal height to ensure the airways remain large enough to transmit a metabolically adequate volume of oxygen. To test this, we collected 17 linear measurements from the nasal skeleton of modern humans from 10 climatically diverse geographic areas (Arctic Circle, Europe, Iran, Australia, North Africa, Khoisan, South African Bantu, East Africa, West Africa, Papua New Guinea). Measurements of associated postcranial elements were then used to estimate body mass and basal metabolic rate (BMR) for each individual. Climatic data were similarly collected for each geographic provenance and employed with morphological data in multivariate analyses. Our results indicate that most measurements of nasal complex breadth are significantly correlated with climate (all r-values >0.45, all p-values <0.009), but not BMR. Conversely, nasal height is more strongly correlated with BMR (r=0.47, p=0.02) than climate. Additionally, nasal passage cross-sectional area demonstrates a positive association with BMR (r=0.74, p=0.0007), while passage cross-sectional shape exhibits a significant relationship with climate (r=0.52, p=0.0017) with taller/narrower airways found in colder-drier environments. Our results support assertions that nasal narrowing in colder climates necessitates a concomitant increase in nasal height to maintain an overall airway size capable of meeting energetic demands for oxygen intake. Future research employing larger, more diverse samples appears poised to provide far-reaching insights regarding climatic adaptation during human evolution.

Graduate Student Competition (cont.)

The role of topography and elevation in shaping middle Eocene mammalian diversity in North America - Ingrid Lundeen, University of Texas at Austin

"Fantasia" is a high-elevation (3140 m) Bridgerian (early Middle Eocene) fossil locality found on Carter Mountain on the western edge of the Bighorn Basin in northwestern Wyoming. Carter Mountain is part of the Absaroka Volcanic Province (AVP), which was one of the major eruptive zones during the Eocene, depositing tuffs and volcaniclastic sedimentary rock throughout the Absaroka Range and into adjacent sedimentary basins. The fauna preserved here lived in the AVP when the Thorofare Creek Volcanic group became active, marked by the ~ 48 Ma Blue Point ash bed, which directly overlies the site. The timing of eruptive events in the AVP, as well as ongoing oxygen isotope paleoaltimetry studies in the region, suggest that this site documents a faunal community that lived at a relatively high elevation, compared with well-sampled basin sites. Here I report results of renewed collecting at Fantasia (2017-19), which approximately tripled the known fossil sample. The most common taxa in the sample reported here are rodents (36%), euarchontans (28%) including particularly abundant Microsyops, Hyopsodus (7%), and Orohippus (6%). Additionally, the site preserves multiple presumed ancestor-descendant pairs as well as a unique diversity of some small-bodied clades. Increased sampling of high-elevation sites like Fantasia provides an opportunity to critically examine sampling biases favoring lowland depositional environments in the North American Eocene. The degree to which this bias has impacted our understanding of faunal community change over time is explored here in light of new data from Fantasia.

Mitonuclear discordance in North American corn snakes (*Pantherophis guttatus* complex) and its implications on species delimitation - Thomas Marshall, University of Texas at Austin

Mitochondrial markers have been widely used over the past 30 years to study phylogeography and infer species boundaries. The utility of these markers for such studies is based on an assumption that variation within mitochondrial genes is largely neutral. However, evidence that different mitochondrial haplotypes within species confer differential fitness, and thus undergo selection, challenges this assumption. This, along with other factors, such as sex-biased dispersal and mitochondrial introgression across species boundaries, can lead to discordant genetic structure between mitochondrial and nuclear genomes. Mitonuclear discordance has been increasingly observed in a wide range of organisms, calling into question mitochondrial-based inferences of species boundaries. Here, we use a cytochrome-b sequence fragment and nuclear SNPs to investigate the presence of mitonuclear discordance in the North American corn snakes (*Pantherophis guttatus*), a complex that has been taxonomically defined by mitochondrial genetic structure. We identified five geographically partitioned mitochondrial haplotypes, indicating greater mitochondrial diversity than was previously recognized. However, only two of these haplotypes are monophyletic in our nuclear SNP phylogeny. Further, population structure analyses using nuclear SNPs provide little evidence of reproductive barriers across haplotype boundaries. We found that, in contrast to the mitochondrial genome, the primary phylogeographic break in the nuclear genome occurs at the Mississippi River. Based on these results, we argue that only two species should be recognized in this group, and that the evidence supports a hypothesis of mitochondrial introgression across species.

Synthesis, Characterization and CO Releasing Property of Palladium (II) Bipyridine Flavonolate Complexes - Sarah Lee Whitfield, Stephen F. Austin State University

A series of bipyridyl (bpy) Pd(II) complexes with 3-hydroxyflavone (fla) [PdbpyflaR][BF4] (R=OCH3 (1), R= CH3 (2), R= H (3), R= Cl (4)) were prepared and characterized. The molecular structures of the four compounds were determined by UV-Vis, 1H NMR, 13C NMR, COSY, HSQC, HMBC, FTIR, ESI mass spectra, and elemental analysis. Their ability to release carbon monoxide was investigated through oxygenation reaction under various conditions of temperature and light irradiation. The nitroxygenation reaction was also studied with nitroxyl, HNO, generated in situ from Angeli's salt. The experimental results showed that oxygenation reaction of [PdBpyFla]+ with oxygen happens at high temperature (> 80ºC) and light doesn't affect the reaction, whereas nitroxygenation reaction with HNO happens at room temperature without light irradiation. Carbon monoxide released from the complexes during the nitroxygenation reaction was trapped by deoxymyglobin.

Geology Field Trip

Sunday, March 1st, 20202 from 8:00 a.m. to 1:00 p.m.

Join us for a field trip focusing on the geology of Nacogdoches. The trip content is of a general nature that anyone attending the meeting would enjoy. The trip is open to all and free of charge! Those going on the trip will need to provide their own transportation.

We will meet at the Stone Fort Museum (1808 Alumni Drive North Griffith Boulevard, Nacogdoches, TX 75961)(GPS: 31.619305 N, -94.649086 W) which is located in front of the Science Building on the circle drive. We will depart at 8:00 a.m. and will be finished by 1:00 p.m. on March 1, 2020.

If you plan on attending the Geology Field Trip, using the link below, please download and print the Texas Academy of Science 2020 Meeting Guidebook: Geology of Nacogdoches, Texas.

https://linkprotect.cudasvc.com/url?a=https%3a%2f%2fscholarworks.sfasu.edu%2fgeology%2f19&c=E,1,nnqyn9KDD9GFarFV8S-2K-JdAGjCqx8u5Wlra35iCtqdlXA3EvROqJA43e3ggk-B8MxePuovPVjbgCXtk3ih3PN6M2l0emsCmV9CNCAxi0135fAO5BoAjaRR4w,,&typo=1

Please feel free to contact us by phone or text.

LaRell Nielson cell: 936-645-5399

Mindy Faulkner cell: 936-554-8716

Friday, February 28

001. TAS Board Meeting
8:00 to 11:30 am
Cole STEM Building, Room 401/402
Texas Academy of Science Annual Meeting
　TAS Board Meeting

002. Section Chairs Pre-Session Lunch Meeting
11:40 am to 12:40 pm
Cole STEM Building, Room 401/402
Texas Academy of Science Annual Meeting
　Section Chairs Pre-Session Lunch Meeting

003. Chemistry and Biochemistry Oral Session 1
1:00 to 3:00 pm
Miller Science Building, Room 234
Chemistry and Biochemistry
　Chemistry and Biochemistry Oral Session 1
Participants:

1:00　003.001　N　**13C NMR Chemical Shift Assignments of Nitrated Benzo[a]pyrenes Based on Two-Dimensional Techniques and DFT/GIAO Calculations**, *Kefa K Onchoke, Stephen F. Austin State University*

1:15　003.002　U　**Analysis of Condensed Tannins in Acorns of Several Species of Oak Trees**, *Russell J. Franks, Stephen F. Austin State University; Alice Huang, Stephen F. Austin State University*

1:30　003.003　G　**Bis(aminophenol) Derivatives for Synthesis of Poly(benzoxazaborole)s and Bis(benzoxazaborole)s**, *Ahangama Munasinghage Thusharika Muthumali, Sam Houston State University; Dustin E Gross, Sam Houston State University*

1:45　003.004　U　**Chemical Probes to Study and Target Cancer Stem Cells**, *Sahil Kalpesh Patel, The University of Texas at Tyler; Jiyong Lee, The University of Texas at Tyler*

2:00　003.005　U　**Designing a Simple Catalytic System for Organic Oxidation Using Iron-Tetradentate Amine Complexes**, *Su Sandi, Stephen F. Austin State University; John Brannon Gary, Stephen F. Austin State University*

2:15　003.006　G　**Determination of Relative Stability of Heteroborole systems using Dynamic Covalent Reactions.**, *Thusini P Hemachandra, Sam Houston State University; Dustin E Gross, Sam Houston State University*

2:30　003.007　G　**Genomic Characterization of the Microbe Clostridium acetobutylicum and its Potential as a Biofuel Source**, *Sarah Jean Reeder, UNIVERSITY OF TEXAS AT TYLER*

2:45　003.008　N　**Guest Inclusion within a Copper (II) Hydrogen-Bonded Bilayer Framework**, *Greg*

Hogan, Texas A&M University - Texarkana

004. Conservation Ecology Oral Session and Section Meeting
1:00 to 3:00 pm
Miller Science Building, Room 137
Conservation Ecology
　Conservation Ecology Oral Session and Section Meeting
Participants:

1:00　004.009　U　**Effect of domestic dogs (***Canis lupus familiaris***) on activity patterns of white-tailed deer (***Odocoileus virginianus***)**, *Lindsey Settles, East Texas Baptist University; Troy A Ladine, East Texas Baptist University*

1:15　004.010　G　**Effects of Artificial Light at Night on Anuran Calling Behavior**, *Ashley Kobisk, Stephen F. Austin State University; Matthew Kwiatkowski, Stephen F. Austin State University*

1:30　004.011　U　*Melia azedarach* **Fruit Toxicity**, *Ashley M Rea, Schreiner University; Chris Distel, Schreiner University*

1:45　004.012　N　**Using modeling to predict and locate Texas native rare plant species**, *Sydney Jackson, Research Assistant; Kim Taylor, BRIT*

2:00　004.013　U　**What Are the Effects of** *Bothriochloa ischaemum* **var.** *songarica* **on Arbuscular Mycorrhizal Fungi Composition and Colonization Rates with Native Grasses?**, *Christiana Aberle, Collin College; Anna Ozelius, Collin College; Tamara Basham, Ph.D., Collin College*

2:15　004.014　G　**The Effects of Urbanization on Alarm Call Selection in Carolina Wrens (***Thryothorus ludovicianus***)**, *Stephen Scribner, Sam Houston State University; Diane Neudorf, Sam Houston State University*

2:30　**Conservation Ecology Section Meeting**

005. General Science Oral Session and Systematics & Evolutionary Biology Oral Session and Section Meeting
1:00 to 3:00 pm
Bush Mathematics Building, Room 130
General Science
　General Science Oral Session and Systematics & Evolutionary Biology Oral Session and Section Meeting
Participants:

1:00　005.015　N　**Frictionless Data for Reproducible Science**, *Lilly Winfree, Open Knowledge Foundation*

1:15　005.016　U　**Water Quality comparisons of San Antonio Rivers**, *Sara Lopez, Student*

1:30　005.017　U　**Environmental antibiotic resistant Enterobacteriaceae**, *Florence Onyoni, Sam Houston State University*

1:45 005.018 G **Salamander Classification With Convolutional Neural Networks**, *Preston Ward, Tarleton State University*

2:00 **Systematics & Evolutionary Biology Section Meeting**

006. Marine Science Oral Session and Section Meeting
1:00 to 3:00 pm
Miller Science Building, Room 139
Marine Science
  Marine Science Oral Session and Section Meeting
Participants:

1:00 006.019 U **The Frequency and Prevalence of Dark Spot Syndrome on Starlet Coral on the Mesoamerican Barrier Reef of the Bay Islands, Honduras**, *Erin Castillo, Texas Tech University; Ashley Renee Roy, Texas Tech at Waco*

1:15 006.020 U **Microplastic Loading in the Sediment of the Mesoamerican Barrier Reef in Roatán, Honduras**, *Zackary Gallardo, McLennan Community College; Alyssa Brooke Clay, McLennan Community College; Kaitlyn Dolan, McLennan Community College; Shannon Kathleen Hill, McLennan Community College; Stephanie Lockwood, Texas Tech University at Waco; Stephanie McMillan Randell, McLennan Community College*

1:30 006.021 U **Associations between algal species on sponge disease in *Xestospongia muta*, and *Aplysina* species observed in Roatán, Honduras**, *Matthew Thomas Hicks, McLennan Community College*

1:45 006.022 G **Foraging Ecology of Bottlenose Dolphins (*Tursiops truncatus*) in Galveston Bay**, *Sherah McDaniel, University of Houston Clear Lake; George J Guillen, University of Houston - Clear Lake*

2:00 006.023 G **Atlantic Rangia, *Rangia cuneata*, in Trinity Bay (Upper Galveston Bay): Ecology and growth in response to freshwater inflow.**, *Mahmoud E Omar, University of Houston - Clear Lake, Environmental Institute of Houston; Jenny W Oakley, Environmental Institute of Houston; George J Guillen, University of Houston - Clear Lake*

2:15 006.024 G **Speckled Worm Eel (*Myrophis punctatus*) in Texas, a common, not so common species**, *Justin Hansen, University of Houston-Clear Lake; George J Guillen, University of Houston - Clear Lake*

2:30 **Marine Science Section Meeting**

007. Mathematics and Computer Science Oral Session and Section Meeting
1:00 to 3:00 pm
Miller Science Building, Room 335
Mathematics and Computer Science
  Mathematics and Computer Science Oral Session and Section Meeting
Participants:

1:00 007.025 U **A Mathematical Model of Circadian Rhythms in Mice**, *Carolyn Fulton, Schreiner University; Kevin Hannay, Schreiner University*

1:15 007.026 G **Counterintuitive No Matter How You Cut It**, *Nicholas Alexander Petela, Tarleton State University*

1:30 007.027 N **Generalizations of the Trigonometry Functions**, *Bryant Wyatt, Traleton State University; John Gresham, Traleton State University*

1:45 007.028 U **N-body Adaptive Optimization of Lattice Towers**, *Jaryd Stone Domine, Tarleton State University; Hakiem Grant, Tarleton State University; Wyatt Young, Tarleton State University*

2:00 007.029 G **N-Body Approach to the Traveling Salesman Problem**, *Johnny Seay, Tarleton State University; Clayton Tobin, Tarleton State University*

2:15 007.030 N **The Mathematics of Celtic Knots**, *Angela M. Brown, Sul Ross State University*

2:30 007.031 U **Using Linear Algebra to grow Jalapeños and Mints**, *William Rommel Serrano, Sul Ross State University*

2:45 **Mathematics and Computer Science Section Meeting**

008. Neuroscience Oral Session and Section Meeting
1:00 to 3:00 pm
Bush Mathematics Building, Room 101
Neuroscience
  Neuroscience Oral Session and Section Meeting
Participants:

1:00 008.032 U **Development of a Nicotine Withdrawal Model in Zebrafish**, *Ahmira Manalac, University of Texas at Tyler; Norma Perez-Garcia, University of Texas at Tyler; Maria Alejandra Rivero, University of Texas at Tyler; Daisy Vargas, University of Texas at Tyler; Vanessa Rosado, University of Texas at Tyler; Ayman Hamouda, University of Texas at Tyler; Brent R Bill, University of Texas at Tyler*

1:15 008.033 U **Identification of Glutathione within Neuronal cells**, *Diego Rojas, Abstract Submission; George Perry, Co-Author*

1:30 008.034 U **Study of the Effects of Bisphenol S on Hippocampal Neurons**, *Alyssa Schneider, Texas Lutheran University; Danielle Grove, Texas Lutheran University*

1:45 008.035 G **LRP1 as a modulator of CXCR4 in hippocampal neurogenesis and neurodegeneration**, *Kristi Guerrero, UT Health SA;*

Erzsebet Kokovay, UT Health San Antonio; Naomi L. Sayre, UT Health San Antonio

2:00   008.036   N   **Methylene blue prevents neurodegeneration and memory impairment by preserving cytochrome oxidase activity in brain regions susceptible to chronic hypoperfusion**, *Francisco Gonzalez-Lima, University of Texas at Austin; Allison M. Auchter, University of Texas at Austin; Douglas W. Barrett, University of Texas at Austin*

2:15   **Neuroscience Section meeting**

009. Physics and Engineering Oral Session and Section Meeting
1:00 to 3:00 pm
Miller Science Building, Room 334
Physics and Engineering
    Physics and Engineering Oral Session and Section Meeting
Participants:

1:00   009.037   N   **Carbon-60 Model Design**, *Dan Bruton, Stephen F. Austin State University; Christopher Aul, Stephen F. Austin State University; Collin Timmons, Stephen F. Austin State University*

1:15   009.038   U   **N-body Simulation of Contact Binary Star Evolution Using Nvidia GPUs**, *Mason Andrew McCallum, Student*

1:30   009.039   N   **Sub-Meter Distance Measurements using Mobile App Sensors**, *Dan Bruton, Stephen F. Austin State University; Hector Ochoa, Stephen F. Austin State University; James T. Adams, Stephen F. Austin State University*

1:45   009.040   U   **Investigation of Potential Power Generation from Flared Natural Gas**, *Patrick Edward Mileski, Midland College*

2:00   009.041   U   **Mathematical Methods for Approximating the Van der Pol Equation**, *Lee Walter Henslee, Student; Jonathan Mitchell, Stephen F. Austin State University*

2:15   **Physics and Engineering Section Meeting**

010. Plant Biology Oral Session 1
1:00 to 3:00 pm
Miller Science Building, Room 233
Plant Biology
    Plant Biology Oral Session 1
Participants:

1:00   010.042   G   **Comparative anatomy of the photosynthetic stems of *Euphorbia antisyphilitica* (Euphorbiaceae) and *Asclepias subulata* (Apocynaceae)**, *Jackson F. Burkholder, Texas State University; David E. Lemke, Texas State University*

1:15   010.043   G   **Comparative anatomy of the submersed and emergent stems and leaves of**

Shinnersia rivularis **(Asteraceae: Eupatorieae)**, *Megan Herod, Texas State University; David E. Lemke, Texas State University*

1:30   010.044   G   **Effects of increased atmospheric carbon dioxide levels on Tobacco Mosaic Virus infection in resistant and susceptible tomatoes**, *Angie W Nicholas, Stephen F. Austin State University; Robert J Wiggers, Stephen F. Austin State University*

1:45   010.045   N   **An illustrated flora for the Texas and Louisiana pineywoods**, *James Edwin VanKley, Stephen F. Austin State University; Bruce Lyndon Cunningham, Bruce Lyndon Cunningham Productions*

2:00   010.046   U   **Flora of the Runningwater Conservancy, Hale County, TX**, *Krista Epley, Wayland Baptist University; Matthew S. Allen, Wayland Baptist University*

2:15   010.047   U   **Flora of the Wood Conservation Easement in Callahan County, Texas**, *Destiny Brokaw, Abilene Christian University; Joshua Michael Brokaw, Abilene Christian University*

2:30   010.048   G   **First record of a plant-animal interaction from the Late Cretaceous Wayan Formation of eastern Idaho**, *Marquise Gates, Texas State University; Joan M. Parrott, Texas State University; David E. Lemke, Texas State University*

2:45   010.049   G   **Identification of an interesting petrified log from the Late Cretaceous Olmos Formation of Maverick County, Texas**, *Shelby Conway, Texas State University; David E. Lemke, Texas State University*

011. STEM Education Oral Session and Section Meeting
1:00 to 3:00 pm
Bush Mathematics Building, Room 132
STEM Education
    STEM Education Oral Session and Section Meeting
Participants:

1:00   011.050   N   **Improving Student Success in General Chemistry I at UT Permian Basin**, *Milka O Montes, University of Texas Permian Basin; Aidely Aranda, University of Texas Permian Basin*

1:15   011.051   N   **An iterative process for improving student performance on foundational concepts in biochemistry**, *Mary Kopecki-Fjetland, St. Edward's University*

1:30   011.052   N   **Promoting active learning in an upper level immunology course**, *Joni Ylostalo, University of Mary Hardin-Baylor*

1:45   011.053   N   **Creation of an undergraduate community college research program**, *Phillip Greco, Temple College; Jason L Locklin, Temple College*

2:00   **STEM Education Section Meeting**

012. Friday Afternoon Coffee Break
3:00 to 3:30 pm
Cole STEM Building, Atrium
Texas Academy of Science Annual Meeting
Friday Afternoon Coffee Break

013. Trans-Pecos and Tamaulipan Thornscrub Symposium
3:30 to 4:40 pm
Kennedy Auditorium, Auditorium
Texas Academy of Science Annual Meeting
Trans-Pecos and Tamaulipan Thornscrub Symposium

014. Planetarium Show
5:00 to 6:30 pm
Cole STEM Building, Planetarium
Texas Academy of Science Annual Meeting
Planetarium Show

015. Poster Presentation and Judging: Anthropology, Biomedical Sciences, Cell & Molecular Biology, Conservation Ecology, Freshwater Science, Geoscience, Neuroscience, Terrestrial Ecology & Management
5:00 to 6:30 pm
Cole STEM Building, Hallways
Texas Academy of Science Annual Meeting
Poster Presentation and Judging: Anthropology, Biomedical Sciences, Cell & Molecular Biology, Conservation Ecology, Freshwater Science, Geoscience, Neuroscience, Terrestrial Ecology & Management
Participants:

015.054   U   **Documenting a looted mortuary assemblage from the pre-Incan site of El Campanario, Huarmey, Peru.**, *Urvi Kaul, Texas A&M University; Paloma Cuello del Pozo, Texas A&M University; Jose L. Peña, University of South Florida*

015.055   U   **Influence of Fire on Insect Succession in Cool Weather Forensic Investigations in Central Texas**, *Ashley Renee Roy, Texas Tech at Waco; Stephanie Lockwood, Texas Tech University at Waco*

015.056   U   **Preliminary Analysis of Fossil Golden Mole (Chrysochloridae) Humeri from Swartkrans**, *Zhihao Shen, Department of Anthropology, Baylor University; Timothy Lee Campbell, Department of Anthropology, Baylor University*

015.057   G   **Something to chew on: Diet of omomyine primates from the middle Eocene Devil's Graveyard Formation of West Texas**, *Ben Rodwell, University of Texas at Austin*

015.058   G   **The quantitative analysis of cranial trauma**, *Stephanie Anne Baker, Sam Houston State University; Patrick J Lewis, Sam Houston State University*

015.059   U   **A preliminary assessment of the fossil rodents of Friesenhahn Cave**, *Miranda Mueller, Concordia University Texas; Mary Johnston, Concordia University Texas; Jeffrey Spivey, Concordia University Texas*

015.060   G   **Chemostratigraphy of Carbonate Gravity-Flows of the Wolfcamp Formation in Crockett County, Midland Basin, Texas**, *Alex Blizzard, Stephen F. Austin State University*

015.061   G   **Classification and Delineation of Subsurface Karst Potential Using Electrical Resistivity in the Manning Mountain Region, Fort Hood Military Installation, Texas**, *Jacob Andrew Brillon, SFASU; Melinda Faulkner, Stephen F Austin State University*

015.062   N   **Compositional variation across contacts between Packsaddle Domain xenoliths and the Town Mountain Granite analyzed by hXRF, Llano uplift, central Texas**, *Liane M. Stevens, Stephen F. Austin State University*

015.063   G   **Delineation of Potential Karst Features Along FM 2185, Culberson County, Texas Using Capacitively-Coupled Electrical Resistivity**, *Lenora Perkins, Stephen F. Austin State University; Wesley Diane Brown, Stephen F. Austin State University; Kevin Stafford, Stephen F. Austin State University*

015.064   G   **Facies Mapping of the Utica shale, Point Pleasant, and Trenton/Lexington formations in East Central Ohio**, *William Kaleb Kirk, student*

015.065   U   **Geochemical Analyses of Base Metals in Sediments and Stream Water, Black Cypress Bayou, Marion County, Texas**, *Melanie Ertons, Stephen F Austin State University; Melinda Faulkner, Stephen F Austin State University*

015.066   U   **Geochemical Analyses of the Carrizo-Wilcox Aquifer in East Texas**, *Andrew William Henry, Stephen F. Austin State University*

015.067   G   **Identification of Pleistocene Fauna from McFadden Beach, TX**, *Mary Deanna Flores, Sam Houston State University; Christopher J Bell, The University of Texas at Austin; Patrick J Lewis, Sam Houston State University*

015.068   G   **Structural Analysis of the Salt-Sediment Interactions on Top of the Wheeler Dome Salt Tongue Mississippi Canyon area Gulf of Mexico**, *Ryan Micheal Jaska, Stephen F. Austin State University; Wesley Diane Brown, Stephen F. Austin State University*

015.069   G   **The gradational nature of the intrusive contact between Packsaddle schist and Town Mountain granite, Enchanted Rock, Llano uplift, central Texas**, *Travis Scott Galle, Student;*

Liane M. Stevens, Stephen F. Austin State University

015.070 U **Alzheimer's Disease Ontology to Support Electronic Health Records Data Mining**, *Grace Xiong, University of Texas at Austin*

015.071 U **Characterization of GntR family regulators for genetic circuit part development**, *Prabhat Kattel, The University of Texas at Tyler; Clement T.Y. Chan, The University of Texas at Tyler*

015.072 G **Characterization of *Salmonella enterica* serotypes Heidelberg and Typhimurium Plasmids from Human Clinical Isolates**, *Veronica Elena Rodriguez, Sam Houston State University*

015.073 U **Efforts to Promote Influenza Vaccine Uptake and Education within a Private University's Community of Students and Faculty**, *Chesley Burch, Student; Michelle Crum, Professor*

015.074 U **Evaluation of Effects of Lipopolysaccharides and Alcohol on Neuronal Cells**, *Gabriella Tavera, Texas Southern University; Alamelu Sundaresan, Texas Southern University; Maitreyi Chaganti, Texas Southern University; Vivek Mann, Texas Southern University*

015.075 G **Identification of Bacteria and their Antimicrobial Properties against 5 Multi-Drug Resistant Strains from Soil Samples in the Piney Woods of Texas**, *Caitlyn Mary Gaffney, Sam Houston State University; Florence Onyoni, Sam Houston State University; Aaron Lynne, Sam Houston State University; Jeremy Bechelli, Sam Houston State University*

015.076 U **Processing and Culturing of Human Dermal Cells from Primary Tissue**, *Ashley Ann Perez, Del Mar College; Rebecca Downen, Del Mar College*

015.077 N **Quantum mechanical studies of new inhibitors of xanthine oxidase**, *Chao Dong, The University of Texas of The Permian Basin; Sophealyta Kheang, The University of Texas of The Permian Basin*

015.078 U **Anti-proliferative activity of recombinant disintegrins r-mojastin and r-viridistatin on human pancreatic carcinoma (BXPC-3) cells**, *Amber Sky Alaniz, Delmar College*

015.079 U **Characterizing cell proliferation and migration phenotypes of mutagenized MEF cells and tumorigenic A9 cells**, *Reshma Mariam Varughese, Austin college*

015.080 U **Identification of Antibiotic Resistant *Morganella morganii* and it's Bacteriophage**, *Rodney Ray Cantu, Del mar college*

015.081 G **Interactions of autophagy with Colorado tick fever virus in African green monkey kidney (Vero) cells.**, *Amber Woody, Sam Houston State University; Sarah Owen, Sam Houston State University; Jeremy Bechelli, Sam Houston State University*

015.082 U **Investigating carcinogenesis in early and late stage cancer cell lines**, *Tajal Patel, Austin College; Alisa White, Austin College; Brian Ngyuen, Austin College; Lance F. Barton, Austin College*

015.083 U **Isolation and Characterization of Bacteriophage 'Elkia'**, *Robert James Balarin*

015.084 U **Screening and Isolation of Cancer Cells containing CRISPR Deletion of PA28γ**, *Priya Shah, Austin College; Emily Aller, Austin College; Varun Kotipalli, Austin College; Michelle Ramirez, Austin College; Jessica Hoffman, Austin College; Brittany McMillen, Austin College; Lance F. Barton, Austin College*

015.085 U **The Potential Role of Dynactin in the *Drosophila* Toll Signaling Pathway**, *Beatriz Belchior Pereira, Schreiner University; Brittany Louise Martinez, Schreiner University; Susan Louise Klinedinst, Schreiner University*

015.086 U **The search for insect-specific toxin sequences in the southern black widow spider**, *Angel David Nunez Correa, Stephen F. Austin; Lindsay M Porter, Stephen F. Austin State University*

015.087 U **The Synergistic Effects of Manuka Honey and Gentamicin on Pseudomonas aeruginosa and Staphylococcus aureus**, *Samuel Kenyon, St. Edward's University; Patricia Baynham, St Edward's university*

015.088 U **TRAF in *Amblyomma americanum***, *Javquelyn May, Stephen F Austin; Lindsay M Porter, Stephen F. Austin State University*

015.089 U **Condition Place Preference as an assay for nicotine search behavior in zebrafish**, *Daisy Vargas, University of Texas at Tyler; Ahmira Manalac, University of Texas at Tyler; Norma Perez-Garcia, University of Texas at Tyler; Maria Alejandra Rivero, University of Texas at Tyler; Vanessa Rosado, University of Texas at Tyler; Ayman Hamouda, University of Texas at Tyler; Brent R Bill, University of Texas at Tyler*

015.090 U **Review of Transcriptional modulation in Autism Spectrum Disorder.**, *Zoe R. Williams, University of Texas at Tyler; Bethany M Woolman, University of Texas at Tyler; Brent R Bill, University of Texas at Tyler*

015.091 U **The Effects of Acute Nicotine Exposure on Anxiety in Zebrafish**, *Norma Perez-Garcia, University of Texas at Tyler; Maria Alejandra Rivero, University of Texas at Tyler; Ahmira Manalac, University of Texas at Tyler; Daisy Vargas, University*

of Texas at Tyler; Vanessa Rosado, University of Texas at Tyler; Ayman Hamouda, University of Texas at Tyler; Brent R Bill, University of Texas at Tyler

015.092   U   **Analysis of West Texas Owl Species and Their Feeding Habits in both Runnels and Jones Counties**, *Kayli Briannon Pendley, Hardin Simmons University; Wendi K Wolfram, Hardin Simmons University*

015.093   U   **Carolina Wren nest success and nestling condition in urban and rural habitats**, *Sara Lynn Moore, Sam Houston State University; Diane Neudorf, Sam Houston State University*

015.094   U   **Chemosensory Signaling: Behavioral Interactions on Interspecific Competition Between Gray Fox (*Urocyon cinereoargenteus*) and Red Fox (Vulpes vulpes)**, *Dejah Braxton, Hardin-Simmons University; James Taylor, Hardin-Simmons University; Laura Bennett, Hardin Simmons University; Moses Zirimwabagabo, Hardin-Simmons University; Wendi K Wolfram, Hardin Simmons University*

015.095   U   **Further Exploration into the Nesting Success of the Carolina Wren**, *Gabriel Barragan, University Student; Diane Neudorf, Sam Houston State University*

015.096   U   **Life history and reproductive dynamics of the Phantom Tryonia (Gastropoda)**, *Christina Josephine Ortega, University of Texas Rio Grande Valley; Melissa Anna Lopez, University of Texas Rio Grande Valley; Salma Ruiz, University of Texas Rio Grande Valley; Weston Nowlin, Texas State University; Kathryn Perez, University of Texas Rio Grande Valley*

015.097   U   **The Effects of the Reintroduction of Native Grasses on Native Bird Populations in West Texas**, *Francisco A Velasco, Hardin Simmons University; Bryson T Holcomb, Hardin Simmons University; Jessica Moody, Hardin Simmons University; Laura Bennett, Hardin Simmons University; Wendi K Wolfram, Hardin Simmons University*

015.098   U   **The Effects of Water Quality Through Contamination from Water Developments on Livestock and Wildlife**, *Michaela Gephart, Hardin Simmons University; Megan Moore, Hardin Simmons University; Adrianna Simpson, Hardin Simmons University*

015.099   U   **Comparison of water quality between Leon Creek and Medina River downstream of the Leon Creek Water Recycling Center**, *Justin Nathaniel Ramirez, CIMA*

015.100   U   **Examining the human element of the central Texas zebra mussel invasion**, *Tyler Wilson, Temple College; Jason L Locklin, Temple*

College; Phillip Greco, Temple College

015.101   U   ***Cambarellus shufeldtii* subhabitat selection in an experimental environment setting**, *Neil Ford, UT Tyler Biology; Luke Cunningham, University of Texas at Tyler; Sam J Cunningham, UT Tyler*

015.102   N   **Crime can incur penalties: Sticky stigmas trap nectar thieving ants**, *Richard James Wilson Patrock, TAMU-Kingsville, Dept. Biological and Health Sciences and NRCS, Kingsville; Shelley Maher, USDA/Natural Resources Conservation Service; John Reilley, USDA/Natural Resources Conservation Service*

015.103   U   **Differentiation of *Eleutherodactylus cystignathoides* and *E. marnockii* on the basis of call parameters**, *Rebecca T Chastain, Southwestern University; Benjamin A Pierce, Southwestern University*

015.104   U   **Elevated CO_2 levels impact imported fire ant (*S. invicta*) behavior relative to the Texas-native harvester ant (*P. barbatus*)**, *Michael Joseph Klein, Concordia University Texas; Shane Hoelting, Concordia University Texas; Axel Banuelos, Concordia University Texas; Shana Park, Concordia University Texas; Mary Johnston, Concordia University Texas*

015.105   U   **Excess animal fat suppresses *Sorghastrum nutans* growth and microarthropod abundance**, *Rebekah Mullins, Concordia University Texas; Heather Kalenak, Concordia University Texas; Jennifer Gallardo, Concordia University Texas; Emily Richter, Concordia University Texas; Mary Johnston, Concordia University Texas*

015.106   U   **On the Diversity of Erosion Control Products: Implications for Snake Entanglement.**, *Kasey L. Jobe, Stephen F. Austin State University; Nicholas C. Schiwitz, Stephen F. Austin State University; Krista J. Ward, Stephen F. Austin State University; Daniel Saenz, U.S. Forest Service; Christopher M. Schalk, Stephen F. Austin State University*

015.107   U   **Relationship Between *Juniperus ashei* Seedling Mortality and Large Mammal Herbivory**, *Jeremy S Adkins, University of Texas at San Antonio; Oscar W Van Auken, University of Texas at San Antonio*

015.108   U   **Search image development of prey odor in naïve checkered garter snake,** *Thamnophis marcianus*, *Hetal N. Patel, University of Texas at Tyler; Neil Ford, UT Tyler Biology*

015.109   U   **Selection of Egg Nesting Habitat in Twin-spot Rat Snakes, *Elaphe bimaculate***, *Nathaniel James Bilby, UT Tyler Biology; Neil Ford,*

UT Tyler Biology

015.110 N **Tardigrades of Texas: Austin Fifth Graders add another two species to the Texas Biodiversity list**, *Hannah Cotten, Hill Elementary, Austin ISD; William R. Miller, Baker University*

015.111 G **The bees of a sandhill community before and after a rare flooding event in the Big Thicket National Preserve, Texas**, *Archie R Sauls, Stephen F. Austin State University; John Pascarella, Sam Houston State University; Daniel Bennett, Stephen F. Austin State University*

015.112 U **Three-year assessment of small mammals in an urban ecosystem**, *Madison Alexander, East Texas Baptist University; Ariana Lopez, East Texas Baptist University; Troy A Ladine, East Texas Baptist University*

015.113 U **Toxicity Effects of Formic Acid on Lone Star Ticks**, *Bailee Dorsey, Schreiner University; Ryan Caesar, Schriener University; Allan Showler, USDA-ARS KBUSLIRL*

016. Planetarium Show - Repeat Showing
6:30 to 8:00 pm
Cole STEM Building, Planetarium
Texas Academy of Science Annual Meeting
   Planetarium Show - Repeat Showing

017. Poster Presentation and Judging: Chemistry/Biochemistry, General Science, Marine, Mathematics/Computer Science, Physics/Engineering, Plant Biology, STEM, Systematics/Evolutionary Biology
6:30 to 8:00 pm
Cole STEM Building, Hallways
Texas Academy of Science Annual Meeting
   Poster Presentation and Judging: Chemistry/Biochemistry, General Science, Marine, Mathematics/Computer Science, Physics/Engineering, Plant Biology, STEM, Systematics/Evolutionary Biology
Participants:

017.114 G **A Faradaic Nanoscale Water Pump with No Moving Parts**, *Shane Richard Wilson, University of Texas at Arlington; Purnendu Sandy Dasgupta, UTA*

017.115 U **Assembly of Coiled-Coil Peptides via Click Chemistry and Studies Regarding their Self-Assembly**, *Grace Bertles, The Univ. of Texas at Tyler; Samuel Fraley, The University of Texas at Tyler; Dustin Patterson, University of Texas at Tyler; Sean Butler, The University of Texas at Tyler*

017.116 U **Banana Peel Extract: A Potential Ligand for Unusual DNA Motifs**, *Matthew Beasley, Department of Chemistry and Biochemistry, Stephen F Austin State University; Benjamin Mason, Department of Chemistry and Biochemistry, Stephen F Austin State University; Bidisha Sengupta, Stephen F. Austin Statue University Department of Chemistry and Biochemistry*

017.117 U **Biotransformation of Benzofuran Derivatives by Carrot Strips and their Antimicrobial Properties**, *Hailey Frances Jarzynka, Stephen F. Austin State University; Holly Jarzynka, Stephen F. Austin State University; Hannah Trauger, Stephen F. Autsin State University*

017.118 U **Cannabidiol Quantitation and Comparison to Advertised Concentrations Using Liquid Chromatography-Mass Spectrometry**, *Cassandra Nicole Fuller, Schreiner University; Aleksandra Zapata, Schreiner University*

017.119 U **Characterization of Flavonoid-Albumin Binding using Optical Spectroscopy and Molecular Dynamics Simulations**, *Taylor Grays, Department of Chemistry and Biochemistry, Stephen F Austin State University; Humza Khurshid, Department of Chemistry and Biochemistry, Stephen F Austin State University; Bidisha Sengupta, Stephen F. Austin Statue University Department of Chemistry and Biochemistry*

017.120 U **Comparison of Synthetic Routes to Dye Molecules Bearing the Guanadinium Group**, *Allison Conway, Midland College; Thomas Ready, Midland College*

017.121 U **Computational Analysis of Rhenium (I) Complex 1 as a Potential Commercial Alloy and Imaging agent**, *Allison McKee, University of Houston-Downtown; Meheret Tadesse, University of Houston-Downtown*

017.122 U **Copper(II) Complexes of 4,4′-Dimethoxy-2,2′-dipyridyl: Synthesis, Characterization and Cytotoxicity Studies**, *Angel A Garza, University of the Incarnate Word; Rafael A Adrian, University of the Incarnate Word*

017.123 U **Denaturation Analysis of Beta-2-Microglobulin Y66H Mutant**, *Ricardo Garza, Austin College*

017.124 U **De Novo Design and Engineering of Soluble Artificial Kinase Receptor Proteins**, *Manon Leyla Nassar, University of Texas at Tyler; Dustin Patterson, University of Texas at Tyler; May Abdelaziz, University of Texas at Tyler*

017.125 U **Determination of Tannin Content in Gluten Free Grains**, *Kayla M Stewart, Schreiner University; Adrian L Zapata, Schreiner University*

017.126 U **Drug Discovery to Target** *Cryptosporidium parvum, Grace Xiong, University of Texas at Austin*

017.127 U **Elution Profiles of Eleven PAHs on a C-18 Chromatographic Column Using an**

HPLC-UV Method, *Madilynn G. Dewell, Stephen F. Austin State University; Kefa K Onchoke, Stephen F. Austin State University*

017.128   U   **Engineering the HK97 Virus-Like Particle as a Synthetic Cargo Vessel**, *Jeffrey Michael King, University of Texas at Tyler; Dustin Patterson, University of Texas at Tyler*

017.129   U   **Exploration of Functional Groups in N-Derivatized Nitroindolines**, *Philip Baily, University of Texas at El Paso; Patricio Del Castillo, University of Texas at El Paso; Aurelio Paez, University of Texas at El Paso; Matthew R. Weaver, University of Texas at El Paso; Roberto P. Iturralde, University of Texas at El Paso; Carl W. Dirk, University of Texas at El Paso; Chunqiang Li, University of Texas at El Paso; Katja Michael, University of Texas at El Paso*

017.130   G   **Expression of Cyp4f39 in *E. Coli* and Structural Analysis of its Active Site**, *Madri M Jayakody, Sam Houston State University; Donovan C Haines, Sam Houston State University*

017.131   U   **Imidazole: Nature's Special Ligand**, *Neeleigh J. Smith, Stephen F. Austin State University; John Brannon Gary, Stephen F. Austin State University*

017.132   U   **Influence of Composted Wastewater Sludge (CWS) on Zinc Uptake by broccoli (*Brassica oleracea* var.)**, *Brett P Horalan Jr, Stephen F. Austin State University; Kefa K Onchoke, Stephen F. Austin State University*

017.133   U   **Inter- and Intramolecular Interception of a Photochemically Generated Terminal Uranium Nitride**, *Gustavo Miguel Alcantara, University of Texas at El Paso*

017.134   G   **Investigation into Murine ω-Hydroxylase Cyp4f13, a Tumor Cell Potentiator, using Homology Modeling and Molecular Dynamics Simulations**, *Jerome Wade Butler, Sam Houston State University; Donovan Haines, Sam Houston State University*

017.135   U   **Investigation on CO Release of Bipyridine Flavonolate Platinum (II) Complexes**, *Ivan Jimenez, Stephen F. Austin State University*

017.136   U   **Investigation on Oxygenation & Nitroxygenation of Half-Sandwich RuII-Arene-Flavonolate Complexes**, *Jacob Matthew Cotten, Stephen F. Austin State University; Xiaozhen Han, Stephen F. Austin State University*

017.137   U   **Key Design Principles to Achieve Ligand Redox Non-Innocence**, *Alexandra E. Henderson, Stephen F. Austin State University; John Brannon Gary, Stephen F. Austin State University*

017.138   U   **Lanthanide Coordination Polymers with 2-Aminoterephthalate and 2-Bromoterephthalate Linkers**, *Conrado Jimenez, Angelo State University; Levi Glover, Angelo State University; Ralph Zehnder, Angelo State University*

017.139   U   **Mechanoisomerization of Surface-Immobilized Azobenzene**, *Victoria-Thy Lan Doan, University of the Incarnate Word; Madeleine Blumenthal, Texas State University; Heather Hanson, Texas State University; Shiva Rastogi, Texas State University; William Brittain, Texas State University*

017.140   U   **Produced Water Remediation using Clay and Nanocomposite Filters**, *Milka O Montes, University of Texas Permian Basin; Aidely Aranda, University of Texas Permian Basin*

017.141   U   **Silver Nanoclusters on the DNA Scaffold as Probe to Study Protein Folding**, *Abigail Jones, Stephen F. Austin Statue University Department of Chemistry and Biochemistry; Bidisha Sengupta, Stephen F. Austin Statue University Department of Chemistry and Biochemistry*

017.142   U   **Singlet Oxygen Susceptibility of *Candida albicans***, *Arlene M Salazar, University of the Incarnate Word; Abraham N Ruiz, University of the Incarnate Word; Christopher G Pierce, University of the Incarnate Word; Robert N. Garner, University of the Incarnate Word*

017.143   U   **Synthesis and Characterization of Biodiesel Fuels Derived from Hickory Kernel Oil**, *Russell J. Franks, Stephen F. Austin State University; Naidelyn A. Chicas, Stephen F. Austin State University*

017.144   U   **Synthesis and Characterization of *Cu/Ni-ZSM-5***, *Jenna-Rae A Flores, Undergraduate Student at the University of the Incarnate Word; Zachary Gentle, Graduate Student at Tulane University; Daniel Shantz, Faculty Advisor at Tulane University*

017.145   U   **The Determination of Alpha Acids in *Humulus lupulus* (hop) Oils**, *Teah Nicole Tirey, Schreiner University; Aleksandra Zapata, Schreiner University*

017.146   U   **Virtual Screening for Novel Inhibitors of 6-Phosphogluconate Dehydrogenase (6PGDH) in *Leishmania Major***, *Dzung Phuong Pham, University of Texas*

017.147   U   **Examination of the Encapsulation of Protein Cargoes Inside the HK97 Virus-Like Particle**, *Suefian Aiman Kandeel, University of Texas at Tyler; Dustin Patterson, University of Texas at Tyler; Bubacarr Ceesay, University of Texas at Tyler*

017.148   U   **Disease Prevalence in Association with *Spirobranchus giganteus* in Boulder Coral in Roatán, Honduras**, *Terri Cox, Texas Tech University;*

Alaina Tarter, Texas Tech University

017.149   U   **Effects of dusky damselfish algal farms on host coral health on the Mesoamerican Barrier Reef in Roatán, Honduras**, *Maria Lozada, McLennan Community College*

017.150   U   **Potential Vectors for *Millepora*, in Encrusted Octocorals on the Mesoamerican Barrier Reef in Roatán, Honduras.**, *Shirley Stewart, McLennan Community College; Sarah Cole, Texas Tech University at Waco; Madilyn Danielle Hill, McLennan Community College; Alyssa Aquino, McLennan Community College; Katelynn Singh, Texas Tech University at Waco; Shannon Kathleen Hill, McLennan Community College; Stephanie Lockwood, Texas Tech University at Waco; Stephanie McMillan Randell, McLennan Community College*

017.151   H   **HiC-Pipeline: a Kepler and Spark-based Scalable Workflow for Normalized Contact Map Creation**, *Sanjay Nagaraj, Baylor College of Medicine*

017.152   U   **Optimizing shift work schedules using mathematical models for circadian rhythms**, *Courtney Allison Mendez, Schreiner University*

017.153   U   **Moving Object Detection Using Optical Flow Algorithm in Mobile Robot**, *Omer Mir, Univeristy of Houston Downtown; Yuchou Chang, Univeristy of Houston Downtown*

017.154   U   **Neural Networks and Linear Regression to Predict Median Home Value**, *Elda Nazare Costa da Piedade, University of Houston-Downtown*

017.155   U   **Optical Flow Based Mobile Robot Navigation with Search Algorithm**, *Arbaaz Polra, None; Yuchou Chang, Univeristy of Houston Downtown*

017.156   U   **Parameter Estimation and Simulation of Bacteriophage Infection Model**, *Abigail Rose Ballard, Tarleton State University*

017.157   N   **Spectroscopic Properties of Radio Loud And Radio Quiet Quasars**, *Anirban Bhattacharjee, Sul Ross State University*

017.158   U   **A newly discovered pollinator of the grass pink orchid, *Calopogon tuberosus*, from the Watson Rare Native Plant Preserve, Texas**, *Valerie Flores, Stephen F. Austin State University; Lacey Lee, Stephen F. Austin State University; Josephine Taylor, Stephen F. Austin State University; Daniel Bennett, Stephen F. Austin State University*

017.159   U   **Modeling atoms and molecules using virtual reality**, *Juan Gabriel Barron, Student; Brian Barngrover, Stephen F. Austin State University*

017.160   U   **Next Generation's Reaction to**

Weather Warnings During Severe Weather, *Nina Symone Leyva, University of the Incarnate Word; Brianna Aimee Medina, University of the Incarnate Word*

017.161   U   **A 99 million year old lizard from Myanmar with Pan-Gekkotan affinities**, *Christina Harston, Sam Houston State University Natural History Collections; Juan D. Daza, Sam Houston State University Natural History Collections*

017.162   U   **Codon Bias in Turtles**, *Alen Tarboush, University of the Incarnate Word; David Starkey, University of the Incarnate Word*

017.163   G   **Cranial variation in the genus *Zygaspis***, *Antonio Meza, Sam Houston State University; Christopher J Bell, The University of Texas at Austin; Patrick J Lewis, Sam Houston State University*

017.164   U   **Investigating origins of enigmatic populations of *Mentzelia* section *Trachyphytum* (Loasaceae) from western California, USA.**, *Brianna J. Garrett, Abilene Christian University; Sophia G. Wagle, Abilene Christian University; Mariana Castillo, Abilene Christian University; Joshua Michael Brokaw, Abilene Christian University*

017.165   U   **Phylogeography of *Phreatodrobia conica* (Gastropoda: *Cochliopidae*)**, *Vanessa Michelle Torres, University of Texas-Rio Grande Valley; Kathryn Perez, University of Texas Rio Grande Valley; Dominique Alvear, University of Texas Rio Grande Valley; Pete Diaz, U.S. Fish and Wildlife Services*

017.166   U   **Previously unrecognized phenotypic variation among populations in *Mentzelia* section *Trachyphytum* (Loasaceae) from the Southern Coast Ranges of California, USA**, *Destiny Brokaw, Abilene Christian University; Kylie E. Davis, Abilene Christian University; Meghan E. Moten, Abilene Christian University; Joshua Michael Brokaw, Abilene Christian University*

017.167   G   **Taxonomic identification of an East Texas Miocene Proboscidean ivory tusk fragment**, *Savanah Hamilton Davis, Sam Houston State University*

017.168   U   **The highly specialized skull of the lamprophiid snake *Prosymna visseri***, *Elizabeth Marie Kull, Sam Houston State University*

017.169   U   **Oh gecko! What big eyes you have**, *Lauren Yetter, Sam Houston State University; Oscar Ospina, Florida State University; Juan D. Daza, Sam Houston State University Natural History Collections*

017.170   U   **Spatial and olfactory components of territorial defense**, *Lauren Nicole Law, Angelo State University; Ben R Skipper, Angelo State*

University

017.171   U   **The effects of static and dynamic warm ups on balance and agility**, *Cheryl Lianne VanDyke, Concordia University Texas; Kaycie Dunkerley, Concordia University Texas; Samantha Mendez, Concordia University Texas; Mary Johnston, Concordia University Texas*

017.172   U   **The Effect Diet has on the Behavior of African House Snakes,** *Lamprophis fuliginosus*, *Meranda R Ruiz*

Saturday, February 29

018. Past Presidents Breakfast
7:00 to 8:00 am
Cole STEM Building, Room 401/402
Texas Academy of Science Annual Meeting
    Past Presidents Breakfast

019. Anthropology Oral Session and Section Meeting
8:00 to 10:00 am
Miller Science Building, Room 139
Anthropology
    Anthropology Oral Session and Section Meeting
Participants:

8:00   019.173   G   **Aggressive Mimicry as a Human Hunting Strategy**, *Cody J Moser, Texas A&M University*

8:15   019.174   N   **Analysis of southern African Pleistocene rodent humeri from Swartkrans: Members 1-3**, *Timothy Lee Campbell, Department of Anthropology, Baylor University; Thomas J. DeWitt, Texas A&M, Department of Wildlife and Fisheries Sciences; Darryl J. de Ruiter, Texas A&M University, Department of Anthropology*

8:30   019.175   U   **Continued analyses of the unidentified avifaunal humeri from Swartkrans, Members 1-3**, *Margaret Klausmeyer, Department of Anthropology, Baylor University; Thomas A. Stidham, Key Laboratory of Vertebrate Evolution and Human Origins, Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences; Timothy Lee Campbell, Department of Anthropology, Baylor University*

8:45   019.176   G   **Preliminary analyses of archaeological pollen from the Casma Site of El Campanario, Huarmey, Peru**, *Paloma Cuello del Pozo, Texas A&M University; Jose L. Peña, University of South Florida*

9:00   019.177   U   **A Test of Sex, Age, and Ancestry Differences in Auricular Surface Outline Shape**, *Ryan O Martinez, Department of Anthropology, Baylor University; Timothy Lee Campbell, Department of Anthropology, Baylor University*

9:15   **Anthropology Section Meeting**

020. Cell and Molecular Biology Oral Session 1
8:00 to 10:00 am
Bush Mathematics Building, Room 101
Cell and Molecular Biology
    Cell and Molecular Biology Oral Session 1
Participants:

8:00   020.178   U   **A9 Cells Display more Carcinogenic Characteristics than Mutated PA28γ Knockout Cells**, *Brandon Mai, Austin College; Khanh Nguyen, Austin College; Addie Pederson, Austin College*

8:15   020.179   U   **Colorado tick fever virus induces NF-kB and HMGB1 activation in the human microvascular endothelial cell line HMEC-1**, *Luis Angel Grado, Sam Houston State University; Jeremy Bechelli, Sam Houston State University*

8:30   020.180   U   **Expression analysis and RNAi silencing of an immune gene in the lone star tick**, *Jacquelyn M May, Stephen F. Austin State University; Lindsay M Porter, Stephen F. Austin State University*

8:45   020.181   G   **Activation of Apoptosis in Human Endothelial Cells Infected with Colorado Tick Fever Virus**, *Sarah Owen, Sam Houston State University; Jeremy Bechelli, Sam Houston State University*

9:00   020.182   U   **Screening for Novel Regulators of Cancer Cachexia in** *Drosophila melanogaster*, *Alyssia Gabbard, Sam Houston State University; Cheyenne Jennifer Evesson, Sam Houston State University; Immaculate Fri, Sam Houston State University; Mardelle Atkins, SHSU Assistant Professor*

9:15   020.183   U   **A Method to Investigate Tumor-Induced Wasting in** *Drosophila melanogaster*, *Cheyenne Jennifer Evesson, Sam Houston State University*

9:30   020.184   U   **Resolving an insect-specific toxin sequence in the brown widow spider**, *Darrian Simone Frausto, Stephen F. Austin State University; Lindsay M Porter, Stephen F. Austin State University*

9:45   020.185   U   **Identification of Antibiotic Resistant** *Pseudomonas monteilli* **and the Utilization of Bacteriophage in Cell Lysis**, *Taylor L Authement, Del Mar College*

021. Chemistry and Biochemistry Oral Session 2
8:00 to 10:00 am
Miller Science Building, Room 234
Chemistry and Biochemistry
    Chemistry and Biochemistry Oral Session 2
Participants:

8:00   021.186   U   **Identifying a Simple Catalytic System for the Oxidative Functionalization of C-H Bonds**, *Bailey Jameson, Stephen F. Austin State University; John Brannon Gary, Stephen F. Austin*

State University

8:15   021.187   U   **Innerworkings of Protein Purification: Binding of Ni-IDA to His Tags**, *Cole B Donald, Stephen F. Austin State University; Brian Barngrover, Stephen F. Austin State University*

8:30   021.188   N   **Lanthanide Organic Frameworks Using Multiple Linker Systems**, *Ralph Zehnder, Angelo State University*

8:45   021.189   N   **Mechanistic Study of CO Releasing Reactivity of Bis-bipyridyl Flavonolato Ruthenium (II) Complexes**, *Xiaozhen Han, Stephen F. Austin State University*

9:00   021.190   N   **Modifying Materials Prepared from Ring Opening Metathesis Polymerization (ROMP)**, *Christopher Hobbs, Sam Houston State University*

9:15   021.191   G   **Nanoliter-Volume KOH Eluent Generator for Small Bore Capillary Ion Chromatography**, *Bikash Chouhan, University of Texas at Arlington; Purnendu Sandy Dasgupta, UTA*

9:30   021.192   G   **Novel Flexible Moldable Ion-Exchange Polymers**, *Fereshteh Maleki, UTA; Purnendu Sandy Dasgupta, UTA*

9:45   021.193   G   **Rapid, Inexpensive Fabrication of Variable Geometry Resistance Thermometers and Applications with Flowing Solutions**, *Andrew Franklin, University of Texas Arlington*

022. Freshwater Science Oral Session 1
8:00 to 10:00 am
Miller Science Building, Room 137
Freshwater Science
    Freshwater Science Oral Session 1
Participants:

8:00   022.194   N   **A thirty-year assessment of the endangered aquatic macrophyte, *Zizania texana*, in central Texas**, *Jackie Poole, Sul Ross State University; Jeffrey T Hutchinson, University of Texas at San Antonio; Christopher Hathcock, US Fish and Wildlife Service*

8:15   022.195   N   **Zebra mussel settlement, density, survival, and growth in a recently invaded Texas reservoir**, *Jason L Locklin, Temple College; Devin N. Corbitt, Temple College; Robert F. McMahon, University of Texas Arlington*

8:30   022.196   U   **Invasive zebra mussel settlement and density comparisons in two geographically-close central Texas reservoirs**, *Josiah S Moore, Temple college; Brittany L Lokcu, Temple College; Samuel Poster, Temple College; Jason L Locklin, Temple College*

8:45   022.197   G   **A comparison of benthic invertebrate composition between ephemeral pools and permanent pools along upper Leon Creek**, *Alexander Tugay Toder, University of Texas at San Antonio; Jeffrey T Hutchinson, University of Texas at San Antonio*

9:00   022.198   U   **How can DNA help us with conservation in San Solomon Springs?**, *Dominique Alvear, University of Texas Rio Grande Valley; Kathryn Perez, University of Texas Rio Grande Valley; Weston Nowlin, Texas State University; Chris Nice, Texas State University*

9:15   022.199   G   **Characterization of stormwater pollutant transport prior to Low Impact Development installation**, *Eugene Von Bon, University of Texas at San Antonio; Brian Laub, Univeristy of Texas at San Antonio*

9:30   022.200   G   **Mercury contamination characterized by microbial mercury methylation genes in Martin Lake, East Texas**, *Sharon Schmidt, University of Texas at Tyler; Javid McLawrence, Texas A&M AgriLife Research, Department of Soil and Crop Sciences, Texas A&M; Anil Somenahally, Texas A&M AgriLife Research, Department of Soil and Crop Sciences, Texas A&M; Ri-Qing Yu, Department of Biology, University of Texas at Tyler*

023. Plant Biology Oral Session 2 and Section Meeting
8:00 to 10:00 am
Miller Science Building, Room 233
Plant Biology
    Plant Biology Oral Session 2 and Section Meeting
Participants:

8:00   023.201   G   **Phylogenetic Analysis of New World Cypresses (*Hesperocyparis*; Cupressaceae) Using Noncoding Regions of the Chloroplast Genome**, *Alexander Sholl, Lamar University Department of Biology; Randall Terry, Lamar University Department of Biology*

8:15   023.202   N   **Updating the conservation status of *Echinacea atrorubens* (Asteraceae) to inform conservation efforts**, *Erin Flinchbaugh, Botanical Research Institute of Texas; Kim Taylor, BRIT*

8:30   023.203   N   **Vegetation survey of the Yegua Knobbs Preserve, Bastrop and Lee Counties, Texas**, *Diana K. Digges, Texas State University; David E. Lemke, Texas State University*

8:45   **Plant Biology Section Meeting**

024. Saturday Morning Coffee Break
10:00 to 10:30 am
Cole STEM Building, Atrium
Texas Academy of Science Annual Meeting
    Saturday Morning Coffee Break

025. Biomedical Sciences Oral Session and Section Meeting
10:30 am to 12:30 pm

Bush Mathematics Building, Room 130
Biomedical Sciences
 Biomedical Sciences Oral Session and Section Meeting
Participants:

10:30 025.204 N **A review of Taxonomic Changes to the Texas Coralsnake, *Micrurus tener*, with a Previously Unreported Aspect of a Recent Bite**, *James Learned Christiansen, University of Texas, Austin; Travis LaDuc, University of Texas, Austin*

10:45 025.205 U **LIX is an infection-responsive gene in *Amblyomma americanum***, *Gloria Marie Romero, Stephen F. Austin State University; Lindsay M Porter, Stephen F. Austin State University*

11:00 025.206 U **Temporal gene expression analysis in *Amblyomma americanum***, *Sylvia Schepps, Stephen F. Austin; Lindsay M Porter, Stephen F. Austin State University*

11:15 025.207 U **RNAi silencing of a putative immune gene in the lone star tick**, *Bailey Vogel, Stephen F. Austin State University; Lindsay M Porter, Stephen F. Austin State University*

11:30 025.208 U **The Lethal Effects of CimeXa and Drione on *Amblyomma americanum* (lone star tick) Populations**, *Abigail Rosa Garcia, Student; Allan Showler, USDA-ARS KBUSLIRL; Ryan Caesar, Schriener University*

11:45 **Biomedical Sciences Section Meeting**

026. Cell and Molecular Biology Oral Session 2 and Section Meeting
10:30 am to 12:30 pm
Bush Mathematics Building, Room 101
Cell and Molecular Biology
 Cell and Molecular Biology Oral Session 2 and Section Meeting
Participants:

10:30 026.209 U **Species identification of an invasive leatherleaf slug using degenerate primers of the mitochondrial CO1 gene**, *Alison Schofield, The University of Texas Rio Grande Valley; Norman Barr, United States Department of Agriculture; Kathryn Perez, University of Texas Rio Grande Valley*

10:45 026.210 U **Mitochondrial ATP synthesis and the HIPPO pathway coordinately regulate organ growth**, *Logan Robert McDowell, SHSU; Anne Princess Mones, SHSU; Mardelle Atkins, SHSU Assistant Professor*

11:00 **Cell and Molecular Biology Section Meeting**

027. Chemistry and Biochemistry Oral Session 3 and Section Meeting
10:30 am to 12:30 pm
Miller Science Building, Room 234
Chemistry and Biochemistry

Chemistry and Biochemistry Oral Session 3 and Section Meeting
Participants:

10:30 027.211 U **RecA Binds Weakly to Codons That, When Mutated, Lend Isoniazid and Rifampin Resistance in Tuberculosis**, *Ellen Ann Hamzy, Wayland Baptist University*

10:45 027.212 G **Small Molecule Inhibitor of FOXC2 as a Modulator of Epithelial-Mesenchymal Transition in Cancer**, *Weston Alan Manuel, The University of Texas at Tyler; Jiyong Lee, The University of Texas at Tyler*

11:00 027.213 G **Structural Analysis of Mouse Leukotriene B4 ω-Hydroxylase Cyp4f14**, *Madri M Jayakody, Sam Houston State University; Donovan C Haines, Sam Houston State University*

11:15 027.214 U **Synthesis and Characterization of Dangling Ligand Tin Compounds Containing O-methoxymethyl-phenyl groups, e.g. (MeOCH2C6H4)2SnBr2**, *Henk Steven van den Bogaard, The University of Texas at El Paso; Hemant K Sharma, The University of Texas at El Paso; Alejandro Metta-Magana, The University of Texas at El Paso; Keith H Pannell, The University of Texas at El Paso*

11:30 027.215 U **Synthesis of a Tert-butyl Diazaborole-linked Macrocycle using Le Chatelier's Principle**, *Ian Haltom, Sam Houston State University; Dustin E Gross, Sam Houston State University*

11:45 **Chemistry and Biochemistry Section Meeting**

028. Freshwater Science Oral Session 2 and Section Meeting
10:30 am to 12:30 pm
Miller Science Building, Room 137
Freshwater Science
 Freshwater Science Oral Session 2 and Section Meeting
Participants:

10:30 028.216 G **Northern Leon Creek Greenway user and fish population surveys to enhance urban fishing**, *Madeliene Alexandria Buchanan, University of Texas at San Antonio; Jeffrey T Hutchinson, University of Texas at San Antonio; Randall Myers, Texas Parks and Wildlife, Inland Fisheries Division, San Antonio, TX*

10:45 028.217 G **Water quality assessment of the Neches River Watershed above Lake Palestine**, *Samantha Jean Rowe, The University of Texas at Tyler*

11:00 **Freshwater Science Section Meeting**

029. Geosciences Oral Session and Section Meeting
10:30 am to 12:30 pm
Miller Science Building, Room 139
Geosciences

Geosciences Oral Session and Section Meeting
Participants:

10:30 029.218 N **Development of Tool Marks on the Beach Face in Sea Rim State Park, Texas**, *Russell LaRell Nielson, Stephen F. Austin State University*

10:45 029.219 U **Geochemical and Petrographic Analysis of Chert: Parameters for Fracture Analysis**, *Joshua Wynn, Wayland Baptist University; Tim Walsh, Wayland Baptist University*

11:00 029.220 G **Potential sediment source areas of the northeastern Española Basin in north-central New Mexico using major and trace element geochemistry**, *Garrett Ross Williamson, Texas Tech Univeristy; Dustin Sweet, Texas Tech Univeristy*

11:15 029.221 G **Insights to Provenance of Paleozoic Shales from the Midland Basin Using Major and Trace Elements**, *Hunter Green, Texas Tech University*

11:30 029.222 U **Lamniform and Carcharhiniform sharks of the Weches Formation, Nacogdoches County, Texas**, *Jessica Lauren O'Neall, Stephen F. Austin State University; R. LaRell Nielson, Stephen F. Austin State University; Michael Read, Stephen F. Austin State University*

11:45 029.223 G **Paleontologic and Stratigraphic Analysis of the Harrisburg Member of the Kaibab Formation in North Central Arizona**, *Zachery Ted Case, Stephen F. Austin State University; R. LaRell Nielson, Stephen F. Austin State University*

12:00 029.224 G **Synthesis of paleoclimate, paleoecological, and archaeological data for central Texas over the last 20,000 years**, *Stacie Skwarcan, University of Texas at Austin*

12:15 029.225 G **The History of the Nacogdoches Oil Field**, *Hannah Chambers, Stephen F. Austin State University*

12:30 **Geosciences Section Meeting**

030. Terrestrial Ecology & Management Oral Session and Section Meeting
10:30 am to 12:30 pm
Miller Science Building, Room 233
Terrestrial Ecology and Management
 Terrestrial Ecology & Management Oral Session and Section Meeting
Participants:

10:30 030.226 N **Arachnids of the Northern Chihuahuan Desert**, *Christopher Ritzi, Sul Ross State University*

10:45 030.227 U **Comparisons of scarab and cerambycid beetle diversity before and after a rare, hurricane-induced flooding event in southeastern Texas**, *Xander Haynes, Stephen F. Austin State University; Amethyst Michelleanne Haynes, Stephen F. Austin State University; Daniel Bennett, Stephen F. Austin State University*

11:00 030.228 G **Pan trap survey of bee flies (Diptera: Bombyliidae) using novel methodology exploiting color and dark spot attraction behavior**, *Lauren G. Garrett, Sul Ross State Univeristy; Christopher Ritzi, Sul Ross State University*

11:15 030.229 U **Home range and habitat associations from telemetry of Texas horned lizards (*Phrynosoma cornutum*) in the Southern High Plains of Texas**, *Sarah A. Macha, Wayland Baptist University; Andrew C. Kasner, Wayland Baptist University*

11:30 030.230 U **Influence of Incubation Moisture on the Morphology and Behavior of Neonate Corn Snakes, (*Pantherophis guttatus*)**, *Oluwatoni Bami-Ogunbiyi, University of Texas at Tyler; Neil Ford, UT Tyler Biology*

11:45 030.231 N **Bird Diversity in Urban San Antonio: A Look into the Benefits of Native Plant Landscaping**, *Carli Renae Martinez, University of the Incarnate Word*

12:00 030.232 U **Molecular based sex identification and sex ratios of wintering sparrows in the Southern High Plains, Texas**, *Elizabeth Reinhart, Wayland Baptist University; Andrew C. Kasner, Wayland Baptist University; Adam J. Reinhart, Wayland Baptist University*

12:15 030.233 N **Tardigrades of Texas: Austin Fifth Graders add three species to the Texas Biodiversity List**, *Hannah Cotten, Hill Elementary, Austin ISD; William R. Miller, Baker University*

12:30 **Terrestrial Ecology & Management Section Meeting**

031. Lunch
12:30 to 1:45 pm
Cole STEM Building, Atrium
Texas Academy of Science Annual Meeting
 Lunch

032. Business Meeting
1:45 to 2:00 pm
Kennedy Auditorium, Auditorium
Texas Academy of Science Annual Meeting
 Business Meeting

033. Graduate Student Oral Presentation Competition
2:00 to 3:40 pm
Kennedy Auditorium, Auditorium
Graduate Student Paper Competition
 Graduate Student Oral Presentation Competition
Participants:

2:00 033.234 G **Big jumps or little steps: Fighting**

gerrymandering with random walks, *Shawn Michel-Alexander Brody, Tarleton State University*

2:15   033.235   G   **An ex situ evaluation of grasses (Poaceae) for management of roadside runoff in the Edwards Aquifer recharge zone**, *Sarah Gorton, The University of Texas at San Antonio; Jeffrey T Hutchinson, University of Texas at San Antonio; Vikram Kapoor, The University of Texas at San Antonio*

2:30   033.236   G   **Being Nose-y: Investigating the influences of climate and energetics on human nasal anatomy**, *Alexa P. Kelly, University of North Texas Health Science Center; Cara Ocobock, University of Notre Dame; Scott D. Maddux, UNT Health Science Center*

2:45   033.237   G   **The role of topography and elevation in shaping middle Eocene mammalian diversity in North America**, *Ingrid Lundeen, University of Texas at Austin*

3:00   033.238   G   **Mitonuclear discordance in North American corn snakes (*Pantherophis guttatus* complex) and its implications on species delimitation**, *Thomas Marshall, University of Texas at Austin; Drew Davis, University of Texas Rio Grande Valley; David L Hillis, University of Texas at Austin*

3:15   033.239   G   **Synthesis, Characterization and CO Releasing Property of Palladium (II) Bipyridine Flavonolate Complexes**, *Sarah Lee Whitfield, Stephen F. Austin State University; Xiaozhen Han, Stephen F. Austin State University*

034. Saturday Afternoon Coffee Break
3:40 to 4:00 pm
Cole STEM Building, Atrium
Texas Academy of Science Annual Meeting
    Saturday Afternoon Coffee Break

035. Science Jeopardy
4:00 to 5:00 pm
Kennedy Auditorium, Auditorium
Texas Academy of Science Annual Meeting
    Science Jeopardy

036. Section Chair Post-Session Meeting
4:00 to 5:00 pm
Cole STEM Building, Room 401/402
Texas Academy of Science Annual Meeting
    Section Chair Post Session Meeting

037. Outstanding Texas Educator Award and Lecture
5:00 to 5:30 pm
Kennedy Auditorium, Auditorium
Texas Academy of Science Annual Meeting
    Outstanding Texas Educator Award and Lecture

038. Distinguished Texas Scientist Award and Lecture
5:30 to 6:00 pm

Kennedy Auditorium, Auditorium
Texas Academy of Science Annual Meeting
    Distinguished Texas Scientist Award and Lecture

039. Reception
6:30 to 7:30 pm
Nacogdoches Expo Center, Nacogdoches Expo Center
Texas Academy of Science Annual Meeting
    Reception

040. Banquet
7:30 to 9:30 pm
Nacogdoches Expo Center, Nacogdoches Expo Center
Texas Academy of Science Annual Meeting
    Banquet

Friday, February 28

003. Chemistry and Biochemistry Oral Session 1
1:00 to 3:00 pm
Miller Science Building, Room 234
Chemistry and Biochemistry
    Chemistry and Biochemistry Oral Session 1
Participants:

1:00   003.001   N   **13C NMR Chemical Shift Assignments of Nitrated Benzo[a]pyrenes Based on Two-Dimensional Techniques and DFT/GIAO Calculations**, *Kefa K Onchoke, Stephen F. Austin State University*
Nitrated benzo[a]pyrenes are known to be mutagenic, carcinogenic and teratogenic to bacterial and animal cells. For differentiation of isomers and environmental analytical trace studies, spectroscopic information is necessary. The present studies report the 13C NMR spectra of 1-, 3- and 6-nitrobenzo[a]pyrene measured in CDCl3. Complete 13C NMR assignments based on 2D NMR spectroscopy (HMQC and HMBC) were carried out. Further, the computation of fifty 13C chemical shifts of 1-, 3-, and 6-nitrobenzo[a]pyrenes by using GIAO B3LYP/6-311+G(d,p)//B3LYP/6-31+G(d), 6-31+G(d,p), 6-311+G(d), 6-311+G(d,p), 6-311G(d,p) levels of theory was investigated. For 1-, 3- and 6-NBaP the calculated chemical shifts $\square$calc versus$\square\square$expt plots of chemical shifts fall on a linear correlation line with $r^2 > 0.90$. The GIAO B3LYP/6-311+G(d,p)//B3LYP/6-311G(d,p)level of theory was found to yield chemical shifts in good agreement with experiment with $r^2 > 0.95$. The most expensive method (larger basis set) has provided the best agreement with the experiment. It is therefore important to continue to seek computational methods that can predict precise chemical shifts in nitrated or related compounds.

1:15   003.002   U   **Analysis of Condensed Tannins in Acorns of Several Species of Oak Trees**, *Russell J. Franks, Stephen F. Austin State University; Alice Huang, Stephen F. Austin State University*
Tannins are a large class of polyphenolic compounds that are present in many plants. Tannins are divided into two major classes: hydrolyzable tannins and condensed tannins. Condensed tannins are polymeric species, which have polyphenols such as catechin and epicatechin as their basic monomeric structural unit. As part of an effort to determine if a correlation exists between the tannin content of acorns and forage preferences for white-tailed deer (*Odocoileus virginianus*), the condensed tannin content of several species of oak tree native to the East Texas area was determined. Dried acorns from the following species of oak trees: white oak (*Quercus alba*), live oak (*Quercus virginiana*), water oak (*Quercus nigra*), swamp chestnut oak (*Quercus michauxii*), overcup oak (*Querus*

lyrata), and shumard oak (*Quercus shumardii*) were analyzed using the acid-butanol method. In this method, entire acorns were pulverized, defatted, and the condensed tannins were extracted. The tannin mixture was then subjected to oxidative depolymerization using HCl and 1-butanol. The resulting product was then analyzed spectrophotometrically. The condensed tannin content is reported as mg of catechin equivalent per gram of acorn material (mg CE / g acorn), and ranged from 71.0 mg CE/g to 552.6 mg CE/g.

1:30   003.003   G   **Bis(aminophenol) Derivatives for Synthesis of Poly(benzoxazaborole)s and Bis(benzoxazaborole)s**, *Ahangama Munasinghage Thusharika Muthumali, Sam Houston State University; Dustin E Gross, Sam Houston State University*
Boronate ester-based covalent organic frameworks have potential applications in the area of semiconducting materials due to the sp2 hybridized nature of the center boron atom and extended conjugation through the pi system. The synthesis of benzodioxaboroles, benzodiazaboroles, and simple benzoxazaboroles have been reported previously. However, the synthesis of benzoxazaboroles derived from bis(aminophenol)s is less explored. The bis(aminophenol)s can be synthesized using 2-aminophenol and alkyl dibromides. Currently, we are synthesizing oligo- and poly(benzoxazaborole)s using various bis(aminophenol)s and/or bis(boronic acid)s. Subsequently, we are planning to study the ring chain equilibrium of these products. The synthesized products were characterized by 1H and 13C NMR.

1:45   003.004   U   **Chemical Probes to Study and Target Cancer Stem Cells**, *Sahil Kalpesh Patel, The University of Texas at Tyler; Jiyong Lee, The University of Texas at Tyler*
The initial treatment for breast cancer is usually very effective in approximately 90% of breast cancer patients. However, breast cancer survivors still have a high risk of tumor recurrence. Recurrent cancers are typically resistant to conventional therapy; resulting in poor patient survival rate. A recent model for the development of drug-resistant recurrent cancer involves self-renewing malignant progenitors known as cancer stem cells (CSCs). CSC model hypothesizes that most cancers are hierarchically organized and maintained by CSCs that exist as a small population in the tumor. Moreover, CSCs are resistant to the contemporary anti-cancer therapies, and hence become a root of tumor recurrence or metastasis. Therefore, novel therapeutics targeting CSCs hold a great promise in eradicating breast cancer without tumor recurrence. In this study, we have isolated the breast CSC-specific ligand via a cell-binding screen of combinatorial chemical library of peptoids. The CSC ligand-binding cell population displays significant increase in cancer stem cell

characteristics such as tumorigenicity. To the best of our knowledge, this is the first synthetic ligand that was identified to bind directly to breast CSC. Several small molecules have been reported to modulate signaling pathway(s) associated with CSCs but none of them display direct binding to CSC. We will also describe our current research efforts to selectively eradicate CSC population in vivo to block cancer recurrence.

2:00 003.005 U **Designing a Simple Catalytic System for Organic Oxidation Using Iron-Tetradentate Amine Complexes**, *Su Sandi, Stephen F. Austin State University; John Brannon Gary, Stephen F. Austin State University*
Non-heme iron-oxo enzymes are one important class of biological enzymes capable of oxidizing carbon-hydrogen bonds. Given the current chemical enterprise is centered upon the selective oxidation of organic substrates, this class of enzymes has been heavily studied regarding the design of new catalytic systems. Many simple models of these enzyme active sites have been made using tetradentate nitrogen ligands, tris(2-pyridylmethyl) amine (TPA) and bis-pyridyl-dimethylethylene diamine (BPMEN) being two commonly employed ligands. Previous reports have illustrated small steric changes can have dramatic impacts on both chemo- and regio-selectivity. This effect has been illustrated with iron-oxo compounds in both the oxidation of C-H bonds and in the competition between epoxidation and dihydroxylation of olefins. This steric modulation typically occurs at the periphery of the ligand. As a companion to this strategy, this presentation will focus on ligand modulation by changing the chelate ring size of the multidentate ligand. The effect of this modulation will be illustrated in the context of catalytic efficiency and selectivity.

2:15 003.006 G **Determination of Relative Stability of Heteroborole systems using Dynamic Covalent Reactions.**, *Thusini P Hemachandra, Sam Houston State University; Dustin E Gross, Sam Houston State University*
Covalent organic frameworks (COFs) can be developed using dynamic covalent chemistry, which utilizes the reversibility and exchange of covalent bonds to form the most thermodynamically stable product at equilibrium. Heteroborole systems have garnered recent interest for their potential applications in developing COFs. Our research focuses on the functionalization of boronic acid and its derivatives to develop potential monomers to be utilized in the synthesis of novel boron-containing COFs. The dynamic covalent nature of heteroboroles has been investigated by exchanging the parent boroles with ortho-phenylenediamine, ortho-aminophenol, and catechol. Recent studies have focused on exploring the relative stabilities, the kinetics of formation, mechanisms of exchange, and solvent

effects on heteroboroles. NMR spectroscopy and computational chemistry results will be presented.

2:30 003.007 G **Genomic Characterization of the Microbe *Clostridium acetobutylicum* and its Potential as a Biofuel Source**, *Sarah Jean Reeder, UNIVERSITY OF TEXAS AT TYLER*
The bacterium Clostridium acetobutylicum, (a spore-forming bacterium often used as a model species) naturally produces biofuels from organic sources like those found in food waste. Theory predicts that there is no stoichiometric or energetic reason why it should not be possible to shunt almost all metabolism towards butanol production. Approximately 1/3 of the genes in the genome are unannotated or poorly annotated and of the genes whose metabolic functions are described, 25% are inferred based on biochemical modeling rather than positional cloning. This relative dearth of genome sequences for C. acetobutylicum hampers progress on the comparative genomics of butanol production in this species. In collaboration with the Army Research Lab in Adelphi, MD, we have sequenced entire genomes of seven wild strains of C. acetobutylicum and three of the five available industrial strains of the above mentioned. We have an assembled and annotated chromosome and plasmid(s) for each strain sequenced at high coverage, and have characterized variations among genomes including: SNPs, INDELs, rearrangements, inversions, and bacteriophage insertions, especially for those genetic variations likely related with butanol metabolism pathways. We have qualitatively compared the genomes of the industrial strains to the wild strains by examining whether specific genes appear to be enriched for INDELs, transposons, and other structural variants in the industrial strains as compared to wild strains. Methods of engineering such a reaction with increased butanol production can only be achieved through genomic analyses and then be utilized to provide a sustainable, renewable resource for an ever-growing global population.

2:45 003.008 N **Guest Inclusion within a Copper (II) Hydrogen-Bonded Bilayer Framework**, *Greg Hogan, Texas A&M University - Texarkana*
In this study, the investigation of a copper (II) complex, which is formed by a reaction between Cu2+ ions and pyridine-2,4-dicarboxylic acid, yielding the Cu(HPDCA)2(H2O)2 compound. The previously mentioned copper (II) compound reacts with DL-α-methylbenzylamine, resulting in a complex yielding a bilayer framework containing a 5-coordinate copper (II) center. The dissociated water molecule is assisting in the formation of a bilayer. This bilayer framework has the ability to include guest molecules, particularly alkyl-based alcohol and pyridine molecules, which will be discussed herein.

004. Conservation Ecology Oral Session and Section

Meeting
1:00 to 3:00 pm
Miller Science Building, Room 137
Conservation Ecology
    Conservation Ecology Oral Session and Section Meeting
Participants:

1:00   004.009   U   **Effect of domestic dogs (*Canis lupus familiaris*) on activity patterns of white-tailed deer (*Odocoileus virginianus*)**, *Lindsey Settles, East Texas Baptist University; Troy A Ladine, East Texas Baptist University*
Beginning 14 Oct 2014 through 9 Nov 2019, using trail cameras, we investigated the relationship between the activity of white-tail deer (*Odocoileus virginianus*) and domestic dogs (*Canis lupus famimliaris*) throughout the lunar cycle. The study is located at East Texas Baptist University Environmental Studies Area (EnStA; 32º33'N; 94º22'W).   The activity of white-tailed deer is influenced by an interaction of domestic dogs with bobcats, (*Felis rufus*) and coyotes (*Canis latrans*). White-tailed deer are more active when predators are not present and when there is a decrease in cloud cover both diurnal and nocturnal. When domestic dogs and bobcats or coyotes are present concurrently, deer are more active indicating the presence of domestic dogs may act as an anti-predator behavior for the white-tailed deer by making them more aware of the bobcat or coyote. The same effect is not observed when coyotes and bobcats are present together. Our findings indicate an overall negative influence of domestic dogs on the activity of white-tailed deer. However, domestic dogs may play a role in keeping deer more aware of their surroundings in an urban area when bobcats are present, thus, benefitting the white-tailed deer. However, the fear factor may be reduced for the white-tailed deer which may decrease the general overall suitability of the habitat.

1:15   004.010   G   **Effects of Artificial Light at Night on Anuran Calling Behavior**, *Ashley Kobisk, Stephen F. Austin State University; Matthew Kwiatkowski, Stephen F. Austin State University*
The natural environment can be negatively impacted by a variety of human activities, including the production of artificial light at night. Recent studies suggest that anthropogenic light pollution alters animal behavior. Despite their nocturnal activity, little attention has been given to anurans and the effects artificial light at night has on their behavior. We are investigating the effects of artificial light at night on anuran breeding systems in eastern Texas. To determine if artificial light alters calling behavior in male anurans, we are quantifying ambient light and male call variables at sites that vary in urbanization and, therefore, artificial light levels. Calling males are recorded and then ambient light is measured at the call site. Light levels of these microhabitat call sites are then compared to the general light environment measured at 30 random points at each site. Effects of artificial light varied among species. Spring Peepers (*Pseudacris crucifer*) selected call sites that were darker than the general light environment in urbanized areas with higher light levels. In contrast, Green Treefrogs (*Hyla cinerea*) selected darker call sites at a more rural site with lower light levels, but at a more urbanized site with higher light levels, selected call sites that had the same light levels as the general environment. These results suggest anuran species may vary in their sensitivity and response to artificial light at night. Additional variables are being analyzed for differences among urbanized and natural sites, including call dominant frequency, call duration, and call rate.

1:30   004.011   U   ***Melia azedarach* Fruit Toxicity**, *Ashley M Rea, Schreiner University; Chris Distel, Schreiner University*
Melia azedarach, commonly known as chinaberry, is a non-native, exotic tree declared invasive in the United States and globally. This deciduous tree threatens ecosystem stability due to its rapid growth rate, resilience to management, and toxicity to various native species. Recent literature focuses on the antifeedant, insecticidal, and antimicrobial tendencies of chinaberry extracts rather than whole plant matter. Our research analyzed the toxicity of local *Melia azedarach* fruit to western freckled crayfish (*Faxonius occidentalis*). The effects of exposure to varying berry concentrations was evaluated by mortality rate and responsiveness. Laboratory tests displayed high mortality when exposed to as few as three berries in a 10-liter tank. Toxicity to intermediate predators like crayfish could have drastic effects on watersheds invaded by chinaberry.

1:45   004.012   N   **Using modeling to predict and locate Texas native rare plant species**, *Sydney Jackson, Research Assistant; Kim Taylor, BRIT*
Trillium pusillum var. *texanum* (Trilliaceae; Texas trillium) is a globally imperiled (G2) rare plant species found in thirteen counties in Texas and one county in Louisiana. It has been petitioned to be listed under the Endangered Species Act. The Texas Department of Transportation (TxDOT) and other collaborators are working together to create predictive habitat models to assist field biologists in locating and protecting this rare plant on Texas roadsides. Predictive habitat modeling using presence only data sets is a useful tool for identifying new locations of rare native plant species. The locations used for modeling of Texas trillium were consolidated from herbarium records, iNaturalist observations, and information within the Texas Natural Diversity Database. Separated by a one kilometer buffer there are approximately thirty unique populations of Texas trillium dispersed throughout east Texas. Six new

population records were found that were not previously recorded in the Texas Natural Diversity Database. The model was created via maxent modeling method using presence-only data to predict locations of rare plant species in Texas. Field validation of the model is in progress to evaluate how well the model predicts the presence and absence of this rare plant species by surveying 50 randomly-generated points for the presence of the species within the model's habitat probability classes. The predictive model for *T. pusillum* var. *texanum* including preliminary results of the field validation will be presented, as well as implications for conservation of the species.

2:00 004.013 U **What Are the Effects of Bothriochloa ischaemum var. songarica on Arbuscular Mycorrhizal Fungi Composition and Colonization Rates with Native Grasses?**, *Christiana Aberle, Collin College; Anna Ozelius, Collin College; Tamara Basham, Ph.D., Collin College*
Given mounting evidence that we are in the midst of another mass extinction, developing methods of preserving species has become a primary focus in conservation research. In the case of prairie and savanna ecosystems in Texas, the primary cause of biodiversity declines is an interaction between habitat loss and invasive species as human populations expand. The invasive grass, *Bothriochloa ischaemum* var. *songarica*, King Ranch Bluestem (KR) is driving native grasses out of what is left of their natural habitats throughout Texas. This decline in plant biodiversity has negatively impacted biodiversity at all other levels within invaded ecosystems. Arbuscular mycorrhizal fungi (AMF) colonization is critical to many native grasses, but previous work suggests that KR is less dependent on AMF. KR has also been shown to negatively impact AMF colonization of native grass roots. A change in AMF species composition or colonization caused by KR invasion might be responsible for its ability to outcompete native grasses. Previous studies have analyzed AMF colonization rates in greenhouse-grown and field-cultivated plants, but there are currently no studies that examine AMF colonization rates and species composition of naturally occurring, field-collected roots. In our work, we asked whether AMF colonization rates and community composition differ between KR and two of its native relatives, and whether these variables differed among species when they were found growing in monocultures or mixtures of all three species. Our results could provide insight into how invasive plants impact mutualisms between native grasses and AMF, and inform new methods for removing KR.

2:15 004.014 G **The Effects of Urbanization on Alarm Call Selection in Carolina Wrens (**Thryothorus ludovicianus **)**, *Stephen Scribner, Sam Houston State University; Diane Neudorf, Sam Houston State University*
Urbanization has caused many songbird populations to decrease. Habitat loss due to increased urban land cover, decreases in biodiversity, reduced food resources, and light pollution have all been documented as side effects of urbanization. More recently, anthropogenic noise caused by urbanization has been looked at with more scrutiny. Birds rely heavily on vocal communication to define territory, attract and locate mates, and warn conspecifics of potential threats. Urban landscapes possess an ambient background noise frequency lower than that of a natural rural environment. Several bird species have been recorded raising their minimum song frequency and amplitude to combat the urban background noise. To date, research has focused primarily on what effects urban noise has on bird song characteristics. However, very little has been studied on the effects of urban noise levels on the alarm calls of birds. In this study, the Carolina Wren (*Thryothorus ludovicianus*) is used as a focal species to examine what effects urbanization has on alarm calls. The purpose of this study is to determine how call use of the Carolina Wren (*T. ludovicianus*) is influenced by urbanization and habitat density. There are two primary objectives to this study. First, vegetation density in both urban and rural habitats will be taken to measure the effectiveness of wren alarm call propagation and selection. Second, response by heterospecific species to multiple alarm calls of the wren in both habitats will be quantified in order to determine what effects population isolation has on influencing alarm call behavior.

005. General Science Oral Session and Systematics & Evolutionary Biology Oral Session and Section Meeting
1:00 to 3:00 pm
Bush Mathematics Building, Room 130
General Science
General Science Oral Session and Systematics & Evolutionary Biology Oral Session and Section Meeting
Participants:

1:00 005.015 N **Frictionless Data for Reproducible Science**, *Lilly Winfree, Open Knowledge Foundation*
Generating insight and conclusions from research data is often not a straightforward process. Data can be poorly structured, hard to find, archived in difficult to use formats, or incomplete. These issues create "friction" and make it difficult to use, publish and share data. The Frictionless Data for Reproducible Research initiative at Open Knowledge Foundation aims to reduce friction in working with scientific data, with a goal to make it effortless to transport data among different tools and platforms for further analysis. This project is a collection of open source software libraries

and a range of best practices for data management, focusing on making research data more open, sharable, and reproducible. Over the past year and a half, we have been working specifically with the researcher community to prototype using Frictionless Data's open source software tools to improve researchers' data workflows and champion reproducibility. This talk will discuss how researchers can make their data more reproducible by showcasing recent collaborative use cases, such as how oceanographers implemented Frictionless Data tooling into their data ingest pipelines to integrate disparate data while maintaining quality metadata.

1:15   005.016   U   **Water Quality comparisons of San Antonio Rivers**, *Sara Lopez, Student*
Human activity and land use can alter chemical and biological characteristics of aquatic ecosystems. Discharge from wastewater treatment plants have been reported to increase nutrient levels and change microbial diversity. The purpose of our study was to evaluate the impact of effluent discharge from the Leon Creek Water Recycling Center on Medina River water quality in San Antonio, Texas. We conducted water quality tests at a site upstream and a site downstream of the water recycling center. Our results suggest that Leon Creek Water Recycling Center effluent discharge does not affect water quality of Medina River. Human land use activities further upstream could be the cause of water quality impairments that have been previously reported.

1:30   005.017   U   **Environmental antibiotic resistant Enterobacteriaceae**, *Florence Onyoni, Sam Houston State University*
Antibiotic resistance is a significant concern across the globe. Specifically, members of enterobacticeae are a major cause of multi-drug resistance nosocomial infections. In this study, 19 environmental isolates were isolated from water across Texas using eosin methylene blue and xylose lysine deoxycholate media. The 16s rRNA gene from each isolate was sequenced to determine the genus and predict molecular phylogeny of the isolates. Based on the 16s sequencing, 47% of the isolates are members of Enterobacteriaceae, 21% Pseudomonadaceae, 16% moraxellaceae, 5% comamonadaceae and neisseriaceae, and the remaining are likely members of flavobacteriaceae. Antibiotic susceptibility testing was conducted on each isolate to determine the resistance or susceptibility against a panel of common antibiotics. The data shows that several of the environmental isoaltes were resistant to commonly prescribed antibiotics. Aeromonas, Enterobacter, E. coli and Acinetobacter were found to be resistant to trimethoprim, rifampin, ampicillin, and amoxicillin/clavulonic acid respectively. The opportunistic pathogens, Pseudomonas and

Chromobacterium, were both resistant to ampicillin, amoxicillin/clavulonic acid, and rifampin. These data indicate that enterobacteriaceae isolated from the environment are exhibiting resistance to multiple antibiotics used to treat these infections. Current and future work include the molecular identification of plasmid and strain genotypes which play a role in horizontal gene transfer events leading to the spread of antibiotic resistance. These findings demonstrate multidrug-resistance occurring in environmental isolates with potential implications of horizontal dissemination.

1:45   005.018   G   **Salamander Classification With Convolutional Neural Networks**, *Preston Ward, Tarleton State University*
Salamanders serve as important tetrapod models for developmental, regeneration and evolutionary studies. To verify species of salamander, genetic sequencing is often utilized. Many museums do not have the necessary equipment to perform DNA sequencing or possess specimens for which DNA sequencing cannot be completed, thus the need for an alternative method for identifying salamanders. This project aims to create a deep learning model that is able to take in a picture of a salamander and return its classification. A Convolution Neural Network is trained to detect highly non-linear patterns on the dorsal and ventral of the specimens indistinguishable to the human eye. Using images and five classifications of salamanders, the model is able to predict with greater than 80% accuracy the correct classification of salamander.

006. Marine Science Oral Session and Section Meeting
1:00 to 3:00 pm
Miller Science Building, Room 139
Marine Science
    Marine Science Oral Session and Section Meeting
Participants:

1:00   006.019   U   **The Frequency and Prevalence of Dark Spot Syndrome on Starlet Coral on the Mesoamerican Barrier Reef of the Bay Islands, Honduras**, *Erin Castillo, Texas Tech University; Ashley Renee Roy, Texas Tech at Waco*
Coral disease outbursts have occurred since the 1970s and have added to coral decline in the Caribbean. Dark spot syndrome (DSS) was first observed in the Caribbean near Columbia during the late 1990s and causes lesions of brown, black, or purple on coral tissue. The primary coral species affected with DSS in the Caribbean are the starlet corals; *Siderastrea siderea, Stephanocoenia intersepta* and *Siderastrea radians*. The cause and impact of DSS throughout the Caribbean has not been determined. Some researchers have suggested that DSS is a general stress response exhibited by the coral and an indicator of coral reef health. This study was conducted to assess the

prevalence and abundance of DSS on starlet coral in Roatán and Utila, Honduras. Established dive sites were surveyed twice for one week in May 2015-2019. As each of the affected coral species were observed, coral identification, DSS status, and depth were recorded while fish bites and boring sponge presence were noted. In 2015 the percent of DSS was 33%, 2016 was 26.32%, 2017 was 9.72%, 2018 was <3% and 2019 had 3.37%. 2015 and 2016 had the most DSS recorded but declined over the next two years. The dive sites with the most recorded DSS were Bear's Den and Barry's Reef in Roatàn and Paraiso and Jack Neil's Point in Utila. Future research of reef health and susceptibility to disease should investigate water chemistry, dive traffic, water currents, and proximity to features, such as the island landfill and golf course.

1:15   006.020   U   **Microplastic Loading in the Sediment of the Mesoamerican Barrier Reef in Roatán, Honduras**, *Zackary Gallardo, McLennan Community College; Alyssa Brooke Clay, McLennan Community College; Kaitlyn Dolan, McLennan Community College; Shannon Kathleen Hill, McLennan Community College; Stephanie Lockwood, Texas Tech University at Waco; Stephanie McMillan Randell, McLennan Community College*
Microplastics could be a contributing factor in the declining health of the world's coral reefs. They are vectors for disease, can choke the coral polyps, and prevent sunlight from reaching the coral. This study was conducted to establish a baseline for microplastic loading in the sediment surrounding Roatán, Honduras. As microplastic filaments make up a disproportionate amount of microplastic waste around the world, it was expected that the majority of extracted microplastics would be filaments. Sediment samples were taken from multiple depths at 5 dive sites from May 12-17, 2019. Each sample was mixed with a saturated saline solution to float the microplastics contained within the sediment. These samples were processed through a Microplastic Sediment Separation Device and poured through a series of filters to extract the microplastics from the samples. The extracted microplastics were counted, measured, categorized, and analyzed for color. A total of 237 microplastics pieces were found in 5.35kg of wet sediment. There was an average of 44.29 pieces of microplastics per kilogram of sediment. The dive site with the highest ratio of microplastic to sediment was Tuk's Treasure. This location was adjacent to a municipal dump, with runoff feeding directly into the coastal waters. The fewest microplastics were found at Mandy's Eel Garden whose location was offshore to a tourist resort. The majority of microplastics that were extracted were fragments and not filaments. This may be due to island life and lack of clothing types that result in high filament shedding.

1:30   006.021   U   **Associations between algal species on sponge disease in *Xestospongia muta*, and *Aplysina* species observed in Roatán, Honduras**, *Matthew Thomas Hicks, McLennan Community College*
Marine sponges (Poriferans) are multicellular, sessile organisms that are part of the coral reef system and obtain nutrients from filtration of water. Poriferans are susceptible to diseases such as orange band, red band, and white patch, however, etiological agents have rarely been identified. Macroalgae has been observed to be successful in spatial competition with sponges and one study found turf alga to be negatively correlated with sponge abundance. In addition to turf algae, *Halimeda* spp. can harbor cyanobacteria, which can be detrimental to sponges. This study was undertaken to assess the association between diseased sponges, specifically *Xestospongia muta* and *Aplysina*, and the type and percent of algae coverage surrounding the diseased sponge. This study was conducted from May 15-17, 2019, on the Mesoamerican Barrier Reef off of the coast of Roatán, Honduras. As target sponge species were identified, researchers placed a meter stick perpendicular to the sponge to have a point of reference for ImageJ analysis. Researchers also identified and photographed algal species within a 0.5 m perimeter around the osculum for *Xestospongia muta*, and from the center of the *Aplysina* sponges. A logistic regression found no correlation between algae and sponge disease (P = 0.89), the most prevalent algae types were turf and *Liagora* species (n = 41) with an average total algal coverage of 51%. A molecular identification of algal species in relation to sponge health would greatly advance the understanding of algae and sponge disease

1:45   006.022   G   **Foraging Ecology of Bottlenose Dolphins (*Tursiops truncatus*) in Galveston Bay**, *Sherah McDaniel, University of Houston Clear Lake; George J Guillen, University of Houston - Clear Lake*
Bottlenose dolphins (*Tursiops truncatus*) are an ecologically important, long lived apex predator found in Galveston Bay (GB). Due to crucial data gaps, the National Marine Fisheries Service considers GB a high priority area for dolphin research. Dolphins have been well documented in West Bay and lower GB but previous studies have revealed only limited dolphin activity in other parts of the bay. One of the most important factors affecting bottlenose dolphin movement patterns is the spatial and temporal distribution of prey resources. One of our research objectives was to estimate likely proportions of different prey items consumed by dolphins using stable isotope mixing models. Data collected from 2015-2017 resulted in 36 individual dolphin tissue samples during remote biopsy surveys. Fish tissue sampling of dolphin's potential prey was conducted in 2015 and 2016. Stable isotope data collected from tissue sampling and historical nekton data were modeled in R

using the MixSIAR package with temporal, spatial, and sex data evaluated as factors. Results from modeling indicated varying proportions of prey in dolphin diets, depending on prey sources included. The models showed shifts in proportions of prey consumed by year, yet little evidence of differences in prey variation by location or between sexes. Yearly prey abundance may be a crucial factor contributing to disparities in the estimated contributions of prey in GB dolphin diets.

2:00   006.023   G   **Atlantic Rangia, *Rangia cuneata*, in Trinity Bay (Upper Galveston Bay): Ecology and growth in response to freshwater inflow.**, *Mahmoud E Omar, University of Houston - Clear Lake, Environmental Institute of Houston; Jenny W Oakley, Environmental Institute of Houston; George J Guillen, University of Houston - Clear Lake*

Atlantic Rangia, *Rangia cuneata*, is a native oligohaline clam has been used as one of a suite of indicator species for establishing freshwater inflow regimes in Texas estuaries including Galveston Bay that represents the largest estuary in Texas and supports the largest shellfish and finfish fisheries. In 2011-2013, the Galveston Bay watershed was exposed to a severe drought of record that reduced freshwater inflows significantly while increasing salinity. Recent surveys (2011-2014) conducted by multiple investigators found that the Trinity River delta, which received the highest freshwater inflow and exhibited the lowest salinities supported the largest specimens (highest mean shell length and meat index and caloric content) compared to other areas of Galveston Bay which received less freshwater inflow. In 2015-2016, while freshwater inflows had increased to long-term average levels within Galveston Bay, we resurveyed Trinity Bay at 50 sites for *R. cuneata* to reevaluate the distribution and growth of this species with increased average meat index $30.3 \pm 0.5\%$ in contrast to $12.5 \pm 0.5\%$ recorded during the previous 2011-2014 studies. This increase was contributed to increased freshwater inflow compared to the drought years 2011-2014. In our current study, high frequency time series of water temperature and salinity were collected from February 2018 to August 2019 at 10 sites in Trinity River Delta. *R. cuneata* were also sampled seasonally for density and size range. These data were compared to freshwater inflow to develop a predictive inflow model relating freshwater inflow, salinity levels, and *R. cuneata* population density and somatic growth.

2:15   006.024   G   **Speckled Worm Eel (*Myrophis punctatus*) in Texas, a common, not so common species**, *Justin Hansen, University of Houston-Clear Lake; George J Guillen, University of Houston - Clear Lake*

All eels share unique larval morphology not only among themselves but with close relatives such as Ladyfish, Tarpon, and Bonefish. This unique leptocephalus life stage promotes transportation as a passive mechanism facilitated by oceanic currents and fronts driving recruitment to nearshore waters. Speckled Worm Eel (*Myrophis punctatus*) are assumed to spawn offshore and metamorphose as they enter estuaries and bays along the Atlantic Coast and the Gulf of Mexico via passive transport. Though commonly documented in catch throughout the literature in their larval and metamorphic phase in various parts of the Gulf and Atlantic, little information exists about Speckled Worm Eel general ecology in Texas. This study used fyke nets placed bi-weekly along the Central and Northern Texas coast in estuarine and coastal marsh habitats from June 2018 to July 2019. A total of 2211 eels were captured over a one-year period. Three life stages were characterized in this study using morphometrics and physical traits; metamorphic, glass eel and elver. Elver were detected every month of the study period and metamorphic and glass eel detection began in December of 2018 and tapered into April 2019. Peak proportions of metamorphic and glass eel were present in February and March, suggesting the bulk of the ingression occurred between these months along the Texas coast. In addition, fyke nets may be a valuable method for detecting early life stages of Speckled Worm Eel, especially elvers that are not easily detectable by traditional gear types.

007. Mathematics and Computer Science Oral Session and Section Meeting

1:00 to 3:00 pm
Miller Science Building, Room 335
Mathematics and Computer Science
    Mathematics and Computer Science Oral Session and Section Meeting
Participants:

1:00   007.025   U   **A Mathematical Model of Circadian Rhythms in Mice**, *Carolyn Fulton, Schreiner University; Kevin Hannay, Schreiner University*

Nearly all organisms exhibit daily cycles of physical, mental, and behavioral activity called circadian rhythms. The surrounding environment of an organism is the greatest influence upon these rhythms. Light particularly has a large influence on the circadian rhythm as it is the greatest force in entrainment patterns, allowing an organism to stay synchronized with the environment. Although all living things are different biologically, chemically, and physically, similarities between rhythms are found across biological clades. Thus, mathematical modeling of subject organisms, such as *Mus musculus* (mice), may be used to revise and extend models of human circadian rhythms. In this work we fit a simple nonlinear dynamical system to a large array of light pulse data

collected for mice. This model will be compared and contrasted against a previous model for human circadian rhythms. This cross-species comparison will allow for improved integration of multiscale data sets between model organisms and human studies. Our work has the potential to assist in the treatment of numerous circadian and sleep disorders.

1:15   007.026   G   **Counterintuitive No Matter How You Cut It**, *Nicholas Alexander Petela, Tarleton State University*
Draw an even number of points on a plane. Split them into equal groups with a straight line. There are only so many ways to group the points, depending on how they are arranged. Which arrangement(s) can be split the most ways? How do you find this configuration on six dots, and verify it is the best? What about eight? Ten? While it seems straightforward, there are a number of strange and sometimes counterintuitive problems that get in the way. This problem turns out to be a hybrid of combinatorics, discrete geometry, and algebra (depending on how you look at it). Come join us as we try and find patterns in the points and the lines.

1:30   007.027   N   **Generalizations of the Trigonometry Functions**, *Bryant Wyatt, Traleton State University; John Gresham, Traleton State University*
In [Gresham, J., B. Wyatt & J. Crawford. 2019. Essential trigonometry without geometry. Texas J. Sci. 71: Article 10. https://doi.org/10.32011/txjsci_71_1_Article10.] the properties, theorems, and identities of the sine and cosine functions are developed using only analytical methods and without geometric constructions. We follow those results and use them to develop generalizations of the key theorems of trigonometry, again using purely analytical methods.

1:45   007.028   U   **N-body Adaptive Optimization of Lattice Towers**, *Jaryd Stone Domine, Tarleton State University; Hakiem Grant, Tarleton State University; Wyatt Young, Tarleton State University*
Power transmission towers cost tens to hundreds of thousands of dollars each, primarily in material costs. By resizing the beams of such towers, we want to make them as light and inexpensive as possible without sacrificing their structural integrity. Known as truss-sizing optimization, this problem is differential in nature and heavily dependent on tower geometry, lending it to a computational approach. Drawing inspiration from the atrophy and hypertrophy of muscles, we develop and evaluate an optimization algorithm that adaptively resizes beams based on their stress – a process that produces rapid results and allows the application of both static and dynamic loads, setting it apart from popular algorithms in this intensely studied field.

2:00   007.029   G   **N-Body Approach to the**

Traveling Salesman Problem, *Johnny Seay, Tarleton State University; Clayton Tobin, Tarleton State University*
Here, we are presenting an N-body approach to instances of the Traveling Salesman Problem, a popular problem in graph theory and combinatorial optimization. In the Traveling Salesman Problem, you are provided a list of cities and either the coordinates of each city or the Euclidean distances between each pair of cities and the goal is to find the shortest possible route that visits each city exactly once and returns to the original city. We introduce our novel N-body approach and variations built on it. We also briefly discuss the implementation of our approach on graphics processing units (GPUs), in which we take advantage of the parallel nature of N-body simulations. We present our preliminary results comparing our approach to the greedy nearest-neighbor algorithm and the convex hull algorithm. We end by presenting our results against known solved instances of the Traveling Salesman Problem.

2:15   007.030   N   **The Mathematics of Celtic Knots**, *Angela M. Brown, Sul Ross State University*
Much of the mathematics dealing with knots and links can be applied to Celtic artwork. By researching the works of Celtic artists and historians, we are able to define a hybridization of the two subjects. A mathematically Celtic knot is a mathematical knot that can be obtained from an alternating closed rectangular pattern by changing certain crossings to vertical or horizontal uncrossings. The closed alternating rectangular pattern is obtained by beginning with an *m* by n grid, where n and m are greater than or equal to 1. The interlacing patterns are obtained by placing dots at the center of each square created by the grid, and then drawing a curve around each of the dots until we get a closed figure. We will discuss the basic elements of knot theory and Celtic art and using this definition, discuss the proofs that every n_1 knot, every $(2n-1)_2$ knot, and every alternating mathematical knot with nine or fewer crossings is mathematically Celtic.

2:30   007.031   U   **Using Linear Algebra to grow Jalapeños and Mints**, *William Rommel Serrano, Sul Ross State University*
Several factors contribute to the growth and harvest quality of jalapeños and mints, but overabundance or scarcity of different resources can negatively impact these plants. Using linear algebra to optimize resource usage with cost-effectiveness to maximize qualitative production can help produce tasty foods within a budget! This experiment consists of a control element for both plants and variables that include water usage, temperature, light intensity, soil type, soil depth, and spacing between plants.

008. Neuroscience Oral Session and Section Meeting

1:00 to 3:00 pm
Bush Mathematics Building, Room 101
Neuroscience
     Neuroscience Oral Session and Section Meeting
Participants:

1:00   008.032   U   **Development of a Nicotine Withdrawal Model in Zebrafish**, *Ahmira Manalac, University of Texas at Tyler; Norma Perez-Garcia, University of Texas at Tyler; Maria Alejandra Rivero, University of Texas at Tyler; Daisy Vargas, University of Texas at Tyler; Vanessa Rosado, University of Texas at Tyler; Ayman Hamouda, University of Texas at Tyler; Brent R Bill, University of Texas at Tyler*
Greater than 30 million people use cigarettes and ~9 million use E-cigarettes in the United States equating to ~200,000 deaths in men and ~180,000 deaths in women. Those individuals who attempt to quit using nicotine without the assistance of pharmaceutical intervention succeed only 3% of the time, and with pharmacologic interventions can increase this success rate 10-fold (~33); however, several side effects have been reported. Our goal is to develop smoking cessation therapies that improve on the current FDA-approved nicotine cessation drug Varenicline. To do this, we are developing a withdraw model for nicotine use in the animal model, zebrafish Danio rerio, that has been demonstrated to reflect the effects of nicotine on humans. Our model is different than previously published withdrawal models in that we only provide small acute exposures to nicotine compared to previous models that utilized constant low levels. Our work suggests that after only 5 exposures failure of a 6th administration increases anxiety. Future studies will look at Varenicline in the model and establish a paradigm for testing other nicotine cessation drugs.

1:15   008.033   U   **Identification of Glutathione within Neuronal cells**, *Diego Rojas, Abstract Submission; George Perry, Co-Author*
In Alzheimer's disease (AD), there is a misconception regarding the fate of neurons undergoing oxidative stress(OS). Two common stances prevail, one supporting the pathway favoring the death of neurons or alternatively that neurons avoid at all costs cell death in order to preserve vital neurochemical connections. In this study, we analyzed glutathione (GSH), arguably the most important cellular antioxidant critical to neuronal survival, and free sulfhydryls in the pathology of oxidative stress and cell death in AD. This pinpointed how neurons persist in AD through years of chronic OS and apoptosis entry. This being likely to indicate the pentose phosphate pathway (PPP) is critical to protecting the neurons from death through GSH production. The research conducted observed the behavior of neurons and the presence of GSH within brain tissue through various anti-glutathione antibodies

utilized in tissue staining. In conclusion, this experiment utilized anti-glutathione antibodies to note if GSH accumulates in AD through the various stages of AD progression, allowing for a clearer understanding of neurons in regards to PPP radicals and OS in conjunction with future development of drugs focused around the PPP and increases in GSH.

1:30   008.034   U   **Study of the Effects of Bisphenol S on Hippocampal Neurons**, *Alyssa Schneider, Texas Lutheran University; Danielle Grove, Texas Lutheran University*
Bisphenol S (BPS) is a molecule found in plastics, paper products, and food products, that is structurally analogous to the compound Bisphenol A (BPA), an environmental estrogen. BPA has been heavily researched and shown to have a wide range of harmful health effects, from reproductive defects to neural effects. Because of this research and associated effects, companies are opting to use BPS as opposed to BPA in their products. However, unlike BPA, BPS has not been extensively researched. The present work investigated if BPS induced a cellular and molecular response at specific low concentrations in cultured hippocampal neurons of mice. This set of neurons was tested because of their importance in long-term memory and learning, as well as their association to estradiol. This work was done by using an indirect ELISA, or a colorimetric assay for the transcription factor phosphorylated CREB (pCREB). Data indicate that an increase in pCREB is displayed in cells treated with low concentrations of BPS, most notably at a BPS concentration of 10-12M ($p<0.001$). These observations indicate that exposure to BPS at low concentrations promotes a response in the hippocampus.

1:45   008.035   G   **LRP1 as a modulator of CXCR4 in hippocampal neurogenesis and neurodegeneration**, *Kristi Guerrero, UT Health SA; Erzsebet Kokovay, UT Health San Antonio; Naomi L. Sayre, UT Health San Antonio*
Neurodegenerative diseases such as Alzheimer's disease pose a growing public health crisis and are projected to triple in prevalence by 2050. An early symptom of Alzheimer's disease is pathological memory loss. Hippocampal neurogenesis is integral to hippocampal memory, and can protect from memory loss when preserved. The chemokine receptor CXCR4 is essential for guiding the migration of neural stem cells from their niche and integrate into hippocampal circuitry. Loss of CXCR4 activity causes hippocampal memory deficits in mouse models. Given this, a better understanding of the regulation of CXCR4 could translate into treatments which prevent memory loss in AD. Our lab has identified a novel regulator of CXCR4 – low density lipoprotein receptor related protein 1 (LRP1). LRP1 itself is implicated in neurodegenerative

disease; LRP1 is decreased in AD patients and is a receptor for both ApoE4 and amyloid beta. We have found that eliminating LRP1 expression in neural stem cells causes decreased CXCR4, which was associated with migratory deficits. In mice, this caused memory deficits at 8 months of age, suggesting dysregulated hippocampal function. Given this, we hypothesize that that LRP1-mediated regulation of CXCR4 in NSCs is essential for hippocampal memory function. We will test this hypothesis using our inducible mouse model, a variety of hippocampal-based functional tests, and in vitro trafficking and expression assays. This research is important because it elucidates a previously unknown link between three independently identified effectors of neurodegenerative disease and adds to a growing knowledge base aimed to furnish disease modulating therapeutics.

2:00   008.036   N   **Methylene blue prevents neurodegeneration and memory impairment by preserving cytochrome oxidase activity in brain regions susceptible to chronic hypoperfusion**, *Francisco Gonzalez-Lima, University of Texas at Austin; Allison M. Auchter, University of Texas at Austin; Douglas W. Barrett, University of Texas at Austin*

In neurocognitive disorders such as Alzheimer's disease and vascular dementia, chronic brain hypoperfusion diminishes cytochrome oxidase activity leading to neurodegenerative effects and impairment of learning and memory. Methylene blue at low doses stimulates cytochrome oxidase activity and may thus counteract the adverse effects of brain hypoperfusion. However, the effects of methylene blue on cytochrome oxidase activity during chronic brain hypoperfusion have not been described before. To test this hypothesis, rats underwent bilateral carotid artery occlusion or sham surgery, received daily 4 mg/kg methylene blue or saline injections, and learned a visual water task. Brain mapping of cytochrome oxidase activity was done by quantitative enzyme histochemistry. Permanent carotid occlusion for one month resulted in decreased cytochrome oxidase activity in visual cortex, prefrontal cortex, perirhinal cortex, hippocampus and amygdala, and weaker interregional correlation of cytochrome oxidase activity between these regions. Methylene blue preserved cytochrome oxidase activity in regions affected by carotid occlusion and strengthened their interregional correlations of cytochrome oxidase activity, which prevented neurodegenerative effects and facilitated task-specific learning and memory. Brain-behavior correlations revealed positive correlations between performance and brain regions in which cytochrome oxidase activity was preserved by methylene blue. These results are the first to demonstrate that methylene blue prevents neurodegeneration and memory impairment by

preserving cytochrome oxidase activity and interregional correlation of cytochrome oxidase activity in brain regions susceptible to chronic hypoperfusion. The results support the hypothesis that stimulating cytochrome oxidase activity with low-dose methylene blue is neuroprotective and may prevent Alzheimer's-like effects caused by chronic brain hypoperfusion.

009. Physics and Engineering Oral Session and Section Meeting
1:00 to 3:00 pm
Miller Science Building, Room 334
Physics and Engineering
    Physics and Engineering Oral Session and Section Meeting
Participants:

1:00   009.037   N   **Carbon-60 Model Design**, *Dan Bruton, Stephen F. Austin State University; Christopher Aul, Stephen F. Austin State University; Collin Timmons, Stephen F. Austin State University*

The development of low cost 3D-printing processes has opened the door for rapid fabrication of models and equipment that can be used as visual or tactile aids in the classroom or laboratory. The goal of this work is to develop two methods of manufacturing handheld models of molecules such as Buckminsterfullerene (Carbon-60). One model design involves using dowel rods to represent atomic bonds held by 3D-printed junctions representing atomic centers. A second model involves the design of spheres (atoms) with three flat surfaces that represent the location of the three atomic bonds. Magnets will be housed behind each of the three flat surfaces to represent atomic bonds. We will show that the angles between these bonds are not equal since Carbon-60 has an arrangement of 12 pentagons and 20 hexagons. While a simple co-planer bond arrangement with bond angles of 120-degrees could be used for approximate modelling, this creates strain in the bonding rods when compared to the more realistic bond angles. This work will include calculations of unit vectors representing bond angles in Carbon-60. These unit vectors will be rotated to optimize the 3D-printed junction design in order to manufacture models that are not only aesthetic but also intuitive to use in a classroom setting.

1:15   009.038   U   **N-body Simulation of Contact Binary Star Evolution Using Nvidia GPUs**, *Mason Andrew McCallum, Student*

Observations infer that over 50% of the stars in our galaxy are part of a multiple star system. Of these, binary systems are the most intensely studied. Their abundance and unique characteristics, make binary systems invaluable sources of astrophysical data. In this study we are concerned with contact binary systems: a pair of stars in physical contact sharing a common envelope. Due to mass transfer between the stars, the structure and evolution of these systems differ greatly

from single-star systems. Here we develop an N-body model that simulates evolving contact binary star systems. With this, we study the evolution of contact binaries, in particular the role mass transfer between stars plays in this process.

1:30   009.039   N   **Sub-Meter Distance Measurements using Mobile App Sensors**, *Dan Bruton, Stephen F. Austin State University; Hector Ochoa, Stephen F. Austin State University; James T. Adams, Stephen F. Austin State University*
The rapid proliferation of smartphones and tablets has presented a unique opportunity for educators to develop methods of instruction that take advantage of the widespread availability of these devices. The motion, magnetic, and touch sensors in these devices can be used by students to conduct physics and engineering laboratory exercises dealing with analyzing linear or rotational motion. While GPS devices can provide data for distance calculation, the accuracy is insufficient for measurements less than 10 meters. The goal of this work is to develop a method by which distances and angles can be measured accurately using built-in accelerometers and/or gyroscopes for use in laboratory exercises. We will demonstrate that adding constraints to the initial and final state of motion of an accelerometer can reduce errors in distance calculations that result from double integration of noisy data from accelerometers. The results indicate that distances less than 1-meter (i.e. sub-meter distances) can be measured using accelerometers and/or gyroscopes provided that constraints are put on the motion of the devices housing these sensors.

1:45   009.040   U   **Investigation of Potential Power Generation from Flared Natural Gas**, *Patrick Edward Mileski, Midland College*
Natural gas production in the Permian Basin is currently at an all time high. Unfortunately, the increase in abundance of productivity has also caused prices of the gas to fall. With prices low, producers are forced to make a decision about what to do with large quantities of methane. The choice ultimately comes down to paying high price for storage and transmission or to simply flare or vent excess gas into the atmosphere. As of December of 2018, the Permian Basin was producing 13,000,000,000 standard cubic feet of natural gas every day, with rates in 2019 approaching the 14 billion mark. In the first quarter of 2019, the total reported amount of flared and vented natural gas reached 661,000,000 standard cubic feet per day. Currently, this valuable energy resources is just being wasted. There must be some method to take advantage of this truly wasted energy stream. To that end, if the flared gas could instead be used to heat a boiler, the energy produced could be used to power equipment on site or be sold back to the utility

company, turning a waste stream into a source of revenue.

2:00   009.041   U   **Mathematical Methods for Approximating the Van der Pol Equation**, *Lee Walter Henslee, Student; Jonathan Mitchell, Stephen F. Austin State University*
We approximate solutions to well-known 2nd-order nonlinear differential equations using two perturbation techniques. The partial sums give good estimates of frequency and amplitude for the oscillations. We utilize the numerical computing tool MATLAB the project to provide accurate results as well as to illustrate approximations.

010. Plant Biology Oral Session 1
1:00 to 3:00 pm
Miller Science Building, Room 233
Plant Biology
    Plant Biology Oral Session 1
Participants:

1:00   010.042   G   **Comparative anatomy of the photosynthetic stems of** *Euphorbia antisyphilitica* **(Euphorbiaceae) and** *Asclepias subulata* **(Apocynaceae)**, *Jackson F. Burkholder, Texas State University; David E. Lemke, Texas State University*
We compared the structural features of two unrelated perennial herbs with photosynthetic stems native to desert regions of the southwestern United States: candelilla (*Euphorbia antisyphilitica*, Euphorbiaceae) and desert milkweed (*Asclepias subulata*, Apocynaceae). Both species exhibited characteristics commonly seen in plants, other than cacti, with photosynthetic stems: epidermal cells with thickened walls, the presence of a hypodermis, the development of a palisade cortex, and the absence of cortical bundles, a collapsible cortex, and medullary bundles. Nonetheless, the species could be easily distinguished anatomically. The desert milkweed was characterized by a narrow, but well-developed, palisade cortex (cortex:pith ratio ca. 0.2) and the occurrence of internal phloem, while candelilla exhibited a much more extensive, although weakly-developed, palisade cortex (cortex:pith ratio ca. 1.6) and more typical collateral vascular tissue.

1:15   010.043   G   **Comparative anatomy of the submersed and emergent stems and leaves of** *Shinnersia rivularis* **(Asteraceae: Eupatorieae)**, *Megan Herod, Texas State University; David E. Lemke, Texas State University*
Despite estimates that put the total number of flowering plant species as high as 352,000, few of these species are well-adapted to the aquatic habitat. In Texas, the Rio Grande bugheal, *Shinnersia rivularis*, is the sole member of the diverse family Asteraceae that is a true hydrophyte, occurring as both submersed and emergent

individuals in several spring systems in southwestern Texas and in the Llano River of Kimble County. The species is easily recognized in the field by its distinctive growth habit and characteristic inflorescences. We compared the structure of submersed and emergent stems and leaves of S. rivularis to determine if the species exhibits any of the characteristic anatomical features considered to represent adaptations to the aquatic environment, such as differences in cuticle thickness, chloroplast location, number of stomata, tissue differentiation within leaves, and the presence of air-filled tissues. Cuticle is thinner on submersed organs as compared to the emergent stems and leaves. Both aerial and submersed stems show the development of a lacunar system to provide buoyancy and facilitate diffusion of gases within the plant body, although the lacunae are conspicuously radially elongated and occupy a much greater proportion of stem volume in the submersed stems. Submersed and emergent leaves both exhibit a bifacial structure, however, the palisade parenchyma of submersed leaves is not as strongly differentiated as it is in emergent leaves. Calcium oxalate crystals, both druses and dense, spherical clusters of minute rhomboids, are commonly encountered in the aerial organs but were not seen in submersed organs.

1:30   010.044   G   **Effects of increased atmospheric carbon dioxide levels on Tobacco Mosaic Virus infection in resistant and susceptible tomatoes**, *Angie W Nicholas, Stephen F. Austin State University; Robert J Wiggers, Stephen F. Austin State University*
As atmospheric carbon dioxide (CO_2) levels rise, it is important to understand how this may affect plant pathogen interactions. This study focused on the effects of elevated CO_2 and Tobacco Mosaic Virus (TMV) infection in tomatoes (*Solanum lycopersicum*) normally resistant (cv. Bush Early Girl Hybrid) or susceptible (cv Druzba) to TMV. Both resistant and susceptible tomatoes were germinated and grown in chambers with CO_2 either at ambient atmospheric levels or elevated to 750 ppm then mechanically infected with TMV. Every 10 days height and chlorophyll levels were measured, leaves of each plant were tested for TMV presence, and plants were visually rated for symptoms of infection. Both resistant and susceptible plants grown in elevated CO_2 were consistently taller than those grown at atmospheric CO_2. TMV susceptible plants grown in atmospheric CO_2 tested positive for TMV within 10 days of inoculation and showed visual symptoms of the disease earliest, while the susceptible in elevated CO_2 took much longer to show visual symptoms and test positive for TMV, with some of those plants never testing positive. The resistant plants performed equally well at resisting the TMV at both CO_2 levels. Thus, while elevated CO_2 levels had no effect on the response of a resistant cultivar to TMV infection, it did increase the amount of time required for a susceptible cultivar to develop symptoms and show evidence of viral reproduction.

1:45   010.045   N   **An illustrated flora for the Texas and Louisiana pineywoods**, *James Edwin VanKley, Stephen F. Austin State University; Bruce Lyndon Cunningham, Bruce Lyndon Cunningham Productions*
We are writing a flora and field manual for vascular plants of the Pineywoods ecoregion of east Texas and an equivalent area, encompassing Kisatchie National Forest, in west Louisiana. The flora is in three parts: 1) Herbaceous Eudicotyledons; 2) Monocotyledons, Nymphaeids and Herbaceous Magnoliids; and 3) Woody Eudicoyledons, Conifers, and Magnoliids. Part one fills a major gap by providing for the first time a comprehensive local treatment for those taxa. We are using a variety literature sources along with herbarium specimens at ASTC and field plot data to construct treatments and keys. Treatments and family circumscriptions follow the APG IV system. Bruce Cunningham is providing original drawings to illustrate each species. As of December 2019, the introduction, Key to Families of Eudicotyledons, and treatments for 1,060 of 1,330 herbaceous eudicots (Families Acanthaceae-Phytolaccaceae) have been written and illustrations and initial layout have been finished for the Introduction and Acanthaceae-Fabaceae. We aim to finish Part One within the year and publish it shortly thereafter.

2:00   010.046   U   **Flora of the Runningwater Conservancy, Hale County, TX**, *Krista Epley, Wayland Baptist University; Matthew S. Allen, Wayland Baptist University*
Located within the high plains of West Texas, the Runningwater Conservancy in Hale County is a grassland remnant with native, unplowed upland prairie and a playa lake. It is a 29 ha site approximately 25 kilometers west-northwest of Plainview, TX. It is currently enrolled in the Wetland Reserve Program. Inventories of the vascular plant flora in the high plains region are limited with few surveys completed recently. The goal of this project is to catalog all vascular plants occurring in the study area. This project was initiated in the fall of 2017 with walking surveys. Surveys continued during the growing seasons through the fall of 2019. Voucher specimens for all identified taxa have been deposited in the E. L. Reed Herbarium at Texas Tech University. We have identified 103 different plant species in 83 genera and 30 families. Additionally, we seek to compare the floristic diversity of this location with other floristic records of the region. From these comparisons we believe that 29 of the species we found at the Runningwater Conservancy are new records for Hale County. This study improves our floristic knowledge in an understudied region.

2:15   010.047   U   **Flora of the Wood Conservation Easement in Callahan County, Texas**, *Destiny Brokaw, Abilene Christian University; Joshua Michael Brokaw, Abilene Christian University*
The Jesse Wood Homestead consists of approximately 300 hectares of land exhibiting a diverse range of vegetation types and historical land management practices, a substantial proportion of which has been transferred into a conservation easement with the Texas Land Conservancy. This study site lies near the geographic center of Texas at the confluence of three ecoregions: Rolling Plains, Cross Timbers, and the Edwards Plateau. Elements of these ecoregions, including edaphic conditions and vegetation intergrade in our survey site southeast of the Callahan Divide in Callahan County. Biodiversity knowledge in this region is sparse due to large amounts of private land ownership, and no comprehensive survey exists for Callahan County. However, Callahan County is adjacent to Taylor County and comparisons of this flora have been made to W. F. Mahler's *Flora of Taylor County, Texas*. To date, we have identified nearly 200 plant species in more than 80 genera and 30 families, and the percentages of native and exotic species have been calculated. Voucher specimens for all identified taxa will be deposited in the ACU Herbarium at Abilene Christian University and the Botanical Research Institute of Texas.

2:30   010.048   G   **First record of a plant-animal interaction from the Late Cretaceous Wayan Formation of eastern Idaho**, *Marquise Gates, Texas State University; Joan M. Parrott, Texas State University; David E. Lemke, Texas State University*
Ecological interactions between plants and animals are well-known and have been studied extensively since at least the time of Darwin. Common examples of plant-animal interactions include relationships such as herbivory and herbivore defense mechanisms, pollination, fruit and seed dispersal, and a variety of other mutualisms. Although such interactions are commonly seen among extant plants and animals, there is only limited evidence of their occurrence in the fossil record. In the course of surveying material of the fossil wood genus *Paraphyllanthoxlon*, one of us (JMP) observed that a single specimen of P. idahoense from the early Late Cretaceous Wayan Formation of eastern Idaho exhibited an irregular pattern of damage to the wood that was associated with numerous elongate and subhexagonal opaque bodies slightly less than 1 mm in length. Surveys of the literature suggest that these structures are fecal pellets deposited by wood-boring insects, most likely termites (Insecta: Isoptera). On the basis of their habits, modern termites can be divided into three groups: damp-wood termites, dry-wood termites, and subterranean termites. Of these, only dry-wood termites produce fecal pellets that are hexagonal

in shape and within the size range observed in our sample. The fossil record for Isoptera, while not strong, extends back to the Early Cretaceous (ca. 145–140 Ma), although most of these reports are from Europe and the southern hemisphere. Our specimen from the Wayan Formation (ca. 99 Ma) represents one of the few early Late Cretaceous records for North America.

2:45   010.049   G   **Identification of an interesting petrified log from the Late Cretaceous Olmos Formation of Maverick County, Texas**, *Shelby Conway, Texas State University; David E. Lemke, Texas State University*
A petrified log approximately 22 m in length and with a colorful history is on display at the Witte Museum in San Antonio, Texas. The log was originally exposed on a hillside about 6.5 km north of Eagle Pass, Maverick County, Texas, on the Late Cretaceous Olmos Formation and was first noted by former Confederate Army officer William Wallace ("Captain Bill") Townsend in 1887. The log was moved by W. A. Bonnet, an Eagle Pass businessman and notary public, to his family's yard in the city sometime after 1893. It was eventually purchased from Mrs. W. A. Bonnet by businessman and philanthropist Albert Steves of San Antonio, the sections numbered end to end and shipped by rail car to San Antonio, and presented to the museum by Mr. Steves in 1928. The Olmos Formation has yielded a diverse fossil flora in which angiosperms dominate, although pteridophytes, one possible bryophyte, and several gymnosperms have also been described. The Witte Museum log is a gymnosperm, characterized by distinct growth rings with an abrupt transition, an absence of resin canals, tracheids averaging 48 µm in tangential diameter and 37 µm in radial diameter in the early wood and 22 µm in tangential diameter and 9 µm in radial diameter in the late wood, uniseriate to biseriate intertracheary pitting, no helical or callitroid thickenings, and a diffuse arrangement of axial parenchyma. The wood is similar in structure to that of several gymnosperms previously described from the Olmos Formation of adjacent Coahuila, Mexico.

011. STEM Education Oral Session and Section Meeting
1:00 to 3:00 pm
Bush Mathematics Building, Room 132
STEM Education
    STEM Education Oral Session and Section Meeting
Participants:

1:00   011.050   N   **Improving Student Success in General Chemistry I at UT Permian Basin**, *Milka O Montes, University of Texas Permian Basin; Aidely Aranda, University of Texas Permian Basin*
General Chemistry I DFW rates at the University Of Texas Permian Basin (UTPB) for the past seven years were close to 50%. This low rate might indicate a lack

of critical thinking and learning skills of a large and diverse group of students who enroll in this course. In the spring 2019, UTPB launched a Peer-Led Team Learning (PLTL) pilot General Chemistry course with the main objective of increasing student engagement and improving passing rates. Institutional support through partnership with the UTPB Student Success Center and close collaboration with the PLTL group at the University of Texas at El Paso (UTEP) were critical to this project. Due to the novelty of this pilot program, several issues arose throughout the spring semester. This research focuses on the effect of the PLTL model in student involvement, engagement, grade distribution, retention rates, and student satisfaction with the course materials. Preliminary results of this study will be presented.

1:15   011.051   N   **An iterative process for improving student performance on foundational concepts in biochemistry**, *Mary Kopecki-Fjetland, St. Edward's University*
Students entering a first semester biochemistry course are expected to possess knowledge of certain foundational concepts from prerequisite coursework. These foundational concepts are essential for gaining mastery of threshold concepts in biochemistry such as the physical basis of interactions. Unfortunately, many students who enter a biochemistry course possess misconceptions or an incomplete understanding of these foundational concepts. An analysis instrument was utilized as a pretest assessment of student abilities in seven foundational concepts. Targeted interventions including problem based worksheets, tactile learning activities and learning cycle activities were developed and introduced into the classroom followed by re-assessment of student knowledge for potential learning gains. Posttest results revealed certain activities were more effective at improving learning gains. In class observations and student surveys indicate enhanced student engagement during class time and increased collaboration in solving problems. The iterative process of developing and introducing these activities along with their impact on student learning will be discussed.

1:30   011.052   N   **Promoting active learning in an upper level immunology course**, *Joni Ylostalo, University of Mary Hardin-Baylor*
Active learning changes the traditional classroom dynamics into a more student focused and interactive environment. Encouraging student preparation for class sessions and promoting discussions in the classroom enhance the student "buy in" to the course. In here, I describe my experiences in changing a senior level immunology course from a traditional lecture-based style into a more student focused course. To start the process of changing the immunology course, I

generated 3-5 detailed learning objectives for each class resulting in over 100 learning objectives. Next, I generated pre-reading quizzes to be used in the beginning of each class period to encourage student learning before the class meeting. I also selected videos of key processes in immunology and generated short quizzes in the learning management system for the students to be completed after each unit. Furthermore, I selected relevant clinical case studies, applying the learned material, to be completed in groups during the class. Finally, I chose 4-6 critical thinking problems for each lecture to be used during the class time to promote further understanding of the content. These changes resulted in an immunology course in which students did not come into classroom "cold" but rather were prepared for the interactive environment. Students were more engaged into their own learning and were able to share their ideas and discuss openly while working on the classroom problems and case studies. Data is being collected to compare the student performance in a comprehensive final before and after the changes to the course.

1:45   011.053   N   **Creation of an undergraduate community college research program**, *Phillip Greco, Temple College; Jason L Locklin, Temple College*
Research experience enriches undergraduate science education. Unfortunately, community colleges often lack resources that provide their students with these educational opportunities. At Temple College, students, faculty, and administrators worked together to create an undergraduate research program that would enhance the learning experience, foster creativity, and encourage collaboration. Temple College Biological Research Institute (TCBRI) was created to provide community college students with inquiry-based research opportunities in the life sciences that foster critical thinking, enrich the community college experience, and inspire the next generation of scientific scholars. In this presentation, we will share the journey our faculty have taken in conceiving of TCBRI, identifying realistic goals, working with our college and local community, and the hurdles we have encountered so far.

015. Poster Presentation and Judging: Anthropology, Biomedical Sciences, Cell & Molecular Biology, Conservation Ecology, Freshwater Science, Geoscience, Neuroscience, Terrestrial Ecology & Management
5:00 to 6:30 pm
Cole STEM Building, Hallways
Texas Academy of Science Annual Meeting
Poster Presentation and Judging: Anthropology, Biomedical Sciences, Cell & Molecular Biology, Conservation Ecology, Freshwater Science, Geoscience, Neuroscience, Terrestrial Ecology & Management
Participants:

015.054 U Documenting a looted mortuary assemblage from the pre-Incan site of El Campanario, Huarmey, Peru., *Urvi Kaul, Texas A&M University; Paloma Cuello del Pozo, Texas A&M University; Jose L. Peña, University of South Florida*
Looted archaeological sites can only provide a limited amount of information since *in situ* context has been destroyed by treasure hunters. The discipline of bioarchaeology is constantly improving and refining field methodologies in order to properly catalogue and document complicated burial assemblages that have been affected by looting. In this project, we focus on the difficulties behind this process. As an example, we use a mortuary assemblage recovered during the 2019 season at El Campanario Archaeological Project. The Santo Domingo site is a pre-Columbian cemetery (*huaca*) located in the town of Huarmey (coastal Peru). Here, burials had been disturbed by looters and the incidence of modern anthropogenic activities. Modern populations have used the vicinity of this *huaca* as a garbage dump, in addition, looting practices during in the last few decades have removed skeletal remains from primary contexts by spreading bones and cultural material across surface layers. Such disturbances have caused archaeological material to deteriorate at different rates. The deeper layers contained mummified remains and well-preserved artifacts, while material on top layers have suffered the effects of sun-bleaching and other atmospheric agents. Given the specificities of this site, we find the need to adapt previous methodologies that document comingled burials to fit Santo Domingo. Currently, there is not a set of standardized lab techniques to document comingled mummified human remains, therefore, our attempts have followed a trial and error process.

015.055 U Influence of Fire on Insect Succession in Cool Weather Forensic Investigations in Central Texas, *Ashley Renee Roy, Texas Tech at Waco; Stephanie Lockwood, Texas Tech University at Waco*
Fatal fire scenes provide some of the most difficult investigative challenges for fire responders, investigators, forensic experts, and law enforcement agents. Postmortem burning of remains to destroy physical evidence are prevalent in the field of forensic science. Factors considered when predicting PMI included climatological, entomological, and anthropological data. This study aimed to connect the postmortem interval (PMI), to insect succession, and the trauma sustained to a carcass postmortem via burning. This study took place in Central Texas in January to mirror crime scene recoveries where bodies of victims of violent crimes are discovered during the cooler months in Texas. Three stillborn porcine carcasses were utilized; one used as a control and the remaining two treated under different burning scenarios. Once burned, the carcasses were monitored and the data of insect prevalence, insect succession and climate were recorded. The burned carcasses simulated a situation where a victim of a violent act was partially burned by a perpetrator in an attempt to destroy physical evidence. To date studies under these conditions have not been performed with these unique climatological factors. It is predicted that the rate of insect succession on the carcass unclothed-partially burned will be higher than that of the control, and that of the clothed-partially burned carcass. With this data, a narrower PMI may be determined, potentially aiding in the determination of time of deposition of a body at a crime scene, or a dump site after a violent crime has been committed.

015.056 U Preliminary Analysis of Fossil Golden Mole (Chrysochloridae) Humeri from Swartkrans, *Zhihao Shen, Department of Anthropology, Baylor University; Timothy Lee Campbell, Department of Anthropology, Baylor University*
In this study we explore the humeral morphology of fossil golden moles from Members 1-3 of the hominin-bearing site of Swartkrans, South Africa. Golden moles are small insectivorous burrowing mammals in the order Afrosoricida endemic to the region. Previous research using craniodental remains to identify fossil micromammals from Swartkrans recovered three genera and species. To our knowledge, fossil chrysochlorid postcrania from this site have yet to be examined. In this study, fossil gold mole humeri, and a limited sample (n=16) of modern golden mole humri were first sorted, cleaned, and digital photographs of the anterior surface were taken. Data in the form of 2D coordinates were obtained from the digital images using the outline function in TpsDIG v.2.31, and then imported into EFAWin in order to generate shape variables invariant to size, starting position, rotation, and location using Elliptic Fourier Analysis. Resulting shape variables were distilled using PCA, and PC axes representing 95% of the variance were retained. Principal component scores were then used in a UPGMA cluster analysis to identify any natural groupings based on humeral outline shape. Results from our analysis identified two primary groupings, with two possible subgroups found in one of the primaries. These results are congruent with the previous work on fossil golden moles from the site and suggest that analyses of chrysochlorid postcrania may possibly be able to yield taxonomic information. Future studies should focus on obtaining modern comparative samples to test classification accuracy using these elements.

015.057 G Something to chew on: Diet of omomyine primates from the middle Eocene Devil's Graveyard Formation of West Texas, *Ben Rodwell,*

University of Texas at Austin
The Paleogene fossil record of North America represents a diverse collection of primates that flourished throughout the Eocene and Oligocene. Among omomyoid primates, a significant transition in taxonomic makeup takes place during the middle Eocene, when omomyine primates rapidly diversify, while anaptomorphine primates decline in diversity. This transition has been hypothesized to have been driven in part by dietary diversification of omomyine primates. This transition is relatively well understood in paleofaunal communities from the Rocky Mountain region of North America, but less so in other regions, such as the Devil's Graveyard Formation of the Big Bend region of West Texas. Fossil primates from the Devils Graveyard Formation represent a unique collection of omomyines known from the Rocky Mountain Interior alongside a number of endemic species. Molar shearing quotients and body mass estimations are used to reconstruct the dietary ecology of the omomyine primates *Omomys carteri*, *Diablomomys dalquesti*, and two new yet currently undescribed species; Taxon A and Taxon B from the Uintan aged Devils Graveyard Formation of West Texas. Results indicate that *Diablomomys dalquesti* and *Omomys carteri*, were small bodied frugivores, though *Omomys carteri* likely incorporated a significantly higher proportion of faunal matter into its diet than *Diablomomys dalquesti*. Both Taxon A and Taxon B were somewhat larger bodied frugivores, with Taxon A likely consuming a significant proportion of foliage. The Devils Graveyard omomyine primates display dietary niche differentiation supporting hypotheses of omomyine dietary diversification during the middle Eocene.

015.058   G   **The quantitative analysis of cranial trauma**, *Stephanie Anne Baker, Sam Houston State University; Patrick J Lewis, Sam Houston State University*
Cranial suture morphometric analysis provides evidence regarding the presence of fractures, diastasis, and early closure. For example, when trauma to the skull occurs, fracture lines follow areas of weakness and terminate at areas of interruption in the bones, such as another fracture line or a cranial suture. Recently, mCT has been used to differentiate normal cranial sutures from early cranial suture synostosis thus suggesting more data may be available on a microscopic level. Here, I will test for the presence and distribution of diastatic fractures of cranial sutures in cases of trauma to determine if abnormalities in these structures exist. Skeletal specimens examined here are housed at the Southeast Texas Applied Forensic Science Facility in Huntsville, Texas, and consist of three skulls: one with a gunshot wound, blunt force trauma, and sharp force trauma respectively. Amira

6.7.0 was used to visualize, render, and collect data using in program measuring mode to calculate the average width of the specimen's suture every 2 mm radiating from the impact trauma. Coronal suture diameters were measured by observing the crania's internal and external surfaces using coronal, sagittal, and transverse views available with Amira 6.7.0. Asymmetry was determined by the suture diameter found in each specimen relative to the trauma and was compared to the unfractured side of the same specimen as a control. Preliminary results suggest that mCT can thus be used to predict the causes of asymmetry in cranial suture diameter of traumatized bone.

015.059   U   **A preliminary assessment of the fossil rodents of Friesenhahn Cave**, *Miranda Mueller, Concordia University Texas; Mary Johnston, Concordia University Texas; Jeffrey Spivey, Concordia University Texas*
In our study, we sought to compare modern rodent body sizes (reported in the literature) with those from fossils retrieved from Concordia's Friesenhahn Cave in San Antonio, a site rich in Pleistocene (Ice Age) fossils. We hypothesized that Ice Age rodents would be larger than modern specimens found in the same region, in accordance with Bergmann's rule. Our preliminary analyses of the Friesenhahn rodent samples (N=129) consisted of photographing and measuring several aspects of each jaw bone and then using these metrics to predict body size and diversity. Body size relationships to dental elements are well-established for the rodents, and we used these to predict body size. We used morphometric tools to compare our rodent morphotypes with those generated by cluster analysis in multivariate PCA space. Our samples contained five morphospecies, and for evaluating Bergmann's rule, we focused on cricetid rodents, since studies of modern specimens show solid conformity to Bergmann's rule. Our research gives important insight into the types of rodents that inhabited this region during the Pleistocene epoch and an estimation of their sizes. We also now have preliminary data available for any future studies performed on the fossils found in Friesenhahn Cave.

015.060   G   **Chemostratigraphy of Carbonate Gravity-Flows of the Wolfcamp Formation in Crockett County, Midland Basin, Texas**, *Alex Blizzard, Stephen F. Austin State University*
Gravity induced deposition including debris to grain flows are important stratigraphic traps for hydrocarbons reservoirs. They can be explored using higher-order sequence stratigraphy and are abundant across platform-slope and basinal deposits. Studying these gravity-flows along the Central Basin Platform margins can expand an understanding of the stratigraphy that is filling both the Permian Basin. Using elemental data, rock properties that impact reservoir quality such as

mineralogy can be determined, especially when conventional testing of biostratigraphy or lithostratigraphy cannot be applied. This study utilizes five cores containing the Wolfcamp (Lower Permian) Formation from the southeastern slope of the Central Basin Platform in northwest Crockett County, Midland Basin, Texas. High resolution elemental analysis will be conducted using nondestructive handheld X-ray fluorescence (XRF) along with total organic carbon (TOC), X-ray diffraction (XRD), and scanning electron microscope (SEM) at resolutions based on chemofacies defined by the XRF. Interpretation of sequence cycles, depositional conditions, and mineralogy will be used to evaluate small-scale fluctuations in sea level changes due to parasequences and redox-sensitive trace metals in organic material of the Wolfcamp Formation.

015.061 G   Classification and Delineation of Subsurface Karst Potential Using Electrical Resistivity in the Manning Mountain Region, Fort Hood Military Installation, Texas, *Jacob Andrew Brillon, SFASU; Melinda Faulkner, Stephen F Austin State University*
The Fort Hood Military Installation is home to one of the largest active duty military post in the United States. Located in the Lampasas Cut Plain in Coryell County, Texas, the installation covers an area of over 880 km^2 and is characterized by Lower Cretaceous carbonates from the Trinity and Fredericksburg groups. Scientific research by range managers in the Fort Hood training areas have identified a significant number of surficial and subsurface karst features including caves, shelter caves, sinks, and springs. Recent studies have employed remote sensing and geoanalytical methods to create geographically referenced databases of potential karst depressions, many associated with known features. This study utilized electrical resistivity to characterize and delineate subsurface karst potential associated with known surface phenomena in the Manning Mountain region. Cave maps from the Division of Natural Resource Management at Fort Hood were used to identify inaccessible subsurface voids or infilled passages that could not be explored by traditional cave mapping exercises. 2D and 3D resistivity surveys were conducted using the AGI SuperSting R8/IP coupled with the dipole-dipole array method. Results from these surveys support the potential presence of subsurface karst features associated with existing caves and surficial depressions, and are potentially related to a widespread network of interconnected void space. These data will provide insight for future research in karst landscapes, and support range management plans for military training and natural resource management.

015.062 N   Compositional variation across contacts between Packsaddle Domain xenoliths and the Town Mountain Granite analyzed by hXRF, **Llano uplift, central Texas**, *Liane M. Stevens, Stephen F. Austin State University*
Xenoliths of the ~1.3 Ga Packsaddle Schist hosted by the ~1.1 Ga Town Mountain Granite at "The Slab" swimming hole along the Llano River in Kingsland, Texas, vary in size, shape, texture, and contact style. The xenoliths exhibit both sharp and gradational contacts, which vary from permeated to injected. Orientation analysis suggests that xenolith form was controlled primarily by injection of the anorogenic Town Mountain Granite along foliation planes of the polydeformed Packsaddle Domain following the Grenville orogeny. Sampling the pavement-style outcrops at the popular local swimming hole is both impractical and irresponsible, so a handheld X-ray fluorescence analyzer (hXRF) was deployed to assess compositional variation along the variety of xenolith contacts. Traverses across both sharp and gradational contacts were analyzed using hXRF. Minor compositional variation within the granite may be attributed to grain sizes larger than the 3 mm hXRF spot size. Analyses across gradational contacts reveal expected variation between typical xenolith and granite compositions. Unexpectedly, hXRF analyses of granite near a "sharp" contact exhibit compositional variation similar to that observed at visibly gradational contacts. This compositional variation may be consistent with chemical diffusion between the xenolith and the granite and/or complicated three-dimensional contact relationships.

015.063 G   Delineation of Potential Karst Features Along FM 2185, Culberson County, Texas Using Capacitively-Coupled Electrical Resistivity, *Lenora Perkins, Stephen F. Austin State University; Wesley Diane Brown, Stephen F. Austin State University; Kevin Stafford, Stephen F. Austin State University*
The Delaware Basin of West Texas and New Mexico is the major western subdivision of the Permian Basin. The study area is located within Culberson County, Texas and traverses a distance of 48 kilometers (30 mi) along Farm to Market Road 2185 (FM 2185) within the Gypsum Plain which is positioned on the northernmost region of the Chihuahua Desert. This area includes outcrops of the Castile and Rustler formations that host karst geohazards including sinkholes, subsidence features, and caves from the dissolution of evaporite strata. Due to an increase in traffic flow from commercial petroleum transportation, the extensive karst development poses a significant geohazard threat to infrastructure. The 48 km segment of FM 2185 was investigated using capacitively-coupled resistivity methods to delineate karst features that pose potential geohazard concerns. Data was acquired with the Geometrics OhmMapper G-858 resistivity system, which uses a dipole-dipole configuration composed of

five receivers connected by 2.5 meter coaxial cables and a transmitter offset of 2.5 meters. This geometric configuration enabled resistivity readings up to 5 meters deep. Data was processed using AGI's (Advanced Geometrics Inc.) EarthImager 2D software and used delineate karst related cavities and voids for improved roadway design.

015.064 G Facies Mapping of the Utica shale, Point Pleasant, and Trenton/Lexington formations in East Central Ohio, *William Kaleb Kirk, student*
The Ordovician Utica shale play is a major oil and gas producing interval in the Appalachian Basin. The Utica shale play can be found as far as New York and Canada into Indiana and Kentucky. The Utica shale play consists of the Utica shale, Point Pleasant Formation, and Trenton/Lexington Limestones. The shallow marine fossiliferous limestones of the Trenton and shallow marine shaley limestones of the Lexington are overlain by an interbedded shale and limestone of the Point Pleasant Formation, which grade into the deeper marine interbedded shales and limey shales of the Utica. Previous research of the play covers multiple states. Geochemical and petrophysical data has been conducted for the play with little to no research being done on using litho-facies and electro-facies to understand the relationship of Total Organic Content to density or other factors. The data collected from litho-facies and electro-facies are correlated with production to better understand the driving mechanisms for the Utica shale play. The use of core #1, #2, #3,and #4 and well logs provided by the Ohio Geological Survey and Department of Natural Resources from the research area, are the data for the litho-facies and electro-facies. The use of a computer program called Geologic Analysis via Maximum Likelihood System (GAMLS) will create well to well cross sections. This will take well logs and separate the lithologies into groups based on the different combinations of petrophysical data. This will provide a model for the identified litho-facie and electro-facie patterns and/or trends in eastern Ohio.

015.065 U Geochemical Analyses of Base Metals in Sediments and Stream Water, Black Cypress Bayou, Marion County, Texas, *Melanie Ertons, Stephen F Austin State University; Melinda Faulkner, Stephen F Austin State University*
Black Cypress Bayou is a primary tributary of Caddo Lake watershed in eastern Texas. The watershed is underlain by Eocene-aged strata from the Wilcox and Claiborne groups, which represent transgressive/regressive shoreline fluctuations that deposited interbedded friable sandstones and mudstones. The Wilcox Group is of special interest because it contains lignite coal, which has a direct link to heavy metals in sediment and natural waters. Caddo

Lake has been listed on the Texas Commission on Environmental Quality 303(d) list for impairment due to mercury in edible tissue since 1995 and Black Cypress Bayou has been listed for impaired waters due to elevated copper since 2010. In July 2019, water and sediment samples from six locations along Black Cypress Bayou were analyzed for metal concentrations including Ca, Fe, Pb, Mg, Mn, Na, Zn, and Hg. Physiochemical parameters of water samples (temperature, pH, and conductivity) were recorded in the field; and later analyzed in the laboratory for cation/metals and anion concentrations. Sediment samples were collected along the stream banks, processed, and digested using EPA method 6010 for trace metal analyses and EPA 7471 for mercury analyses. Zinc levels varied throughout the samples, while lead concentrations seemed to decrease as they approached the confluence of Big Cypress Bayou. Other metal concentrations were not detectable or within normal limits for the environment.

015.066 U Geochemical Analyses of the Carrizo-Wilcox Aquifer in East Texas, *Andrew William Henry, Stephen F. Austin State University*
The Carrizo-Wilcox aquifer supplies water resources throughout east and south Texas where it is primarily exploited from confined conditions. However, significant unconfined portions exist in the Sabine Uplift region which transition locally to confined conditions. This study focuses on geochemical analyses of the Carrizo-Wilcox aquifer proximal to the Sabine Uplift using GIS and aquifer data from the Texas Water Development Board. This study investigated trends in concentrations of ions, molecules, and physicochemical parameters throughout the aquifer by creating geochemical heat maps of the region. The data acquired was also investigated for temporal changes in water quality and aquifer depth since many wells are monitored every few years. Data was obtained from the Texas Water Development Board's website for the following counties: Cherokee, Gregg, Harrison, Marion, Nacogdoches, Panola, Rusk, Sabine, San Augustine, Shelby, and Smith. All data from the Carrizo-Wilcox aquifer was downloaded into a Microsoft Excel spreadsheet and extraneous data was removed. Data was reformatted using Microsoft Access to allow for compatibility with ESRI's ArcMap and maps were created with ArcMap through spatial interpolation. Geochemical heat maps were generated for potassium, magnesium, fluoride, bicarbonate, and silica. These maps indicate spatial trends of radial increases with depth in concentrations of most major ions away from the Sabine Uplift region.

015.067 G Identification of Pleistocene Fauna from McFadden Beach, TX, *Mary Deanna Flores, Sam Houston State University; Christopher J*

Bell, The University of Texas at Austin; Patrick J Lewis, Sam Houston State University
McFaddin Beach (MB) runs for approximately 20 miles along the eastern Texas Gulf Coast. It is a secondary deposit for archeological and paleontological specimens and is well known for lithics attributed to several Paleoindian groups. In addition, many fossils are also recovered on the beach. The majority of these fossils appear to be Rancholabrean megafauna, such as mammoth, camel, and horse. Many small MB collections exist throughout the state of Texas. However only one of these collections (Lamar University) has been studied in detail. Using the work from Lamar University as reference, the focus of this study will be on the identification of species housed in the Sam Houston State University (SHSU) collection. Preliminary analysis has determined that this collection contains many megafaunal species that were common throughout the Pleistocene from families Equidae, Camelidae, and Proboscidea. Other common megafauna found are *Holmesina, Bison antiquus, Canis dirus, Megalonyx* , and *Eremotherium*. More uncommon species have also been uncovered in the Sam Houston collections, such as members of Tapiridae, *Homotherium*, and *Castoroides*. The identification of a fossil manatee, the first ever recorded in the Pleistocene of Texas, further distinguishes the SHSU collection from other nearby localities of similar age. The date and location of the MB fossil fauna has the potential to impact our understanding of the timing and nature of the Great American Biotic Interchange, because the location is along the path several taxa are thought to have used to disperse between the Americas.

015.068   G   **Structural Analysis of the Salt-Sediment Interactions on Top of the Wheeler Dome Salt Tongue Mississippi Canyon area Gulf of Mexico**, *Ryan Micheal Jaska, Stephen F. Austin State University; Wesley Diane Brown, Stephen F. Austin State University*
The Mississippi Canyon is located in the northeastern portion of the Gulf of Mexico, just south of the state of Mississippi. In this area, there are many different salt structures present including canopies, diapers, and pillows. The Callovian aged Louann Salt covers this area and is the cause of many of the salt structures and structures of the overlying formations seen in Gulf of Mexico today and Texas. Salt is very mobile when subjected to stress and pressure from overlying sediments and gravity. By careful analysis of 3-D seismic data in combination with available well logs, these subsurface structures will be assessed and interpreted to reveal the various structures and how they occurred in the Wheeler Dome area. This study involves the mapping of salt structures and the surrounding features affected by salt movement to detail the tops of the Louann Salt, isopach maps, and

structure maps within the study area. As the salt moves downslope into adjacent basins, the formations on top of the salt faulted and moved due to the additional stress. The salt movement also caused nearby formations to separate and attach to the salt moving down dip into the basin, thus separating it from the rest of the formation. These faults also caused some rotation of the layers along the faults caused by the salt.

015.069   G   **The gradational nature of the intrusive contact between Packsaddle schist and Town Mountain granite, Enchanted Rock, Llano uplift, central Texas**, *Travis Scott Galle, Student; Liane M. Stevens, Stephen F. Austin State University*
Mesoproterozoic anorogenic magmatism during the final stages of the Grenville orogeny resulted in an intrusive relationship between the ~1.1 Ga Town Mountain Granite and the ~1.3 Ga Packsaddle Schist, now exhumed within the Llano uplift. The southeastern margin of the Enchanted Rock batholith is well exposed at Enchanted Rock State Natural Area in central Texas. The gradational nature of this contact is characterized using field observations, hand sample and thin section petrography, and handheld X-ray fluorescence (hXRF) analysis of hand samples. These data are used to make interpretations about the temperature and depth of emplacement of the Town Mountain Granite. Variation in igneous rock composition, style of foliation, degree of contact concordance, and the gradational nature of the contact were observed along the line of contact. The granitoids near the contact range from fine-grained to coarse-grained in texture, contain quartz + K-feldspar + plagioclase ± biotite ± hornblende, and are classified as granite, quartz-rich granitoid, granodiorite, and alkali feldspar granite. The Packsaddle Schist ranges from gneissic to fine-grained schistose foliation, and contains quartz + muscovite + biotite ± chlorite ± andalusite ± fibrolite. The petrology of these rocks and the complex contact relationships between the injected granite and the polydeformed schist will be discussed.

015.070   U   **Alzheimer's Disease Ontology to Support Electronic Health Records Data Mining**, *Grace Xiong, University of Texas at Austin*
Alzheimer's disease (AD) is a chronic neurodegenerative disorder characterized by the accumulation of beta-amyloid plaques and protein tau tangles in the brain. AD affects the lives of more than 50 million people worldwide and one of the main causes of dementia among older adult. Given the exigency of the situation, research on AD has skyrocketed over the past few years. Unfortunately, even with large amounts of data, there still lacks a treatment to slow the progression of AD. The relative lack of knowledge derived from new AD data poses a problem for health professionals diagnosing AD patients and researchers building upon previous

findings. An informatics approach (machine learning, deep learning) to automatically mine new clues from large-scale data can be a solution. In this article, we introduce our preliminary efforts on designing an ontology specific for supporting the data mining of electronic health records. POADO (Patient Oriented Alzheimer Disease Ontology), is a comprehensive compilation of the most recent information about AD, including the essential elements of both the macro (symptom, risk factor, diagnosis, treatment) and micro-level (anatomy, biomarker, drug, gene, pathology, stage, target, protein, subtype). To enrich the ontology (classes and properties), direct import from well-curated databases and manual extraction from high-quality papers was performed. After manual curation and expert review, an evaluation for its usefulness and community-consensus via Ontokeeper, a semiotic-driven and web-based tool, will be performed. As an in-depth knowledge base, POADO would be promising in enabling computational algorithms to facilitating novel AD subtype discovery.

015.071   U   Characterization of GntR family regulators for genetic circuit part development, *Prabhat Kattel, The University of Texas at Tyler; Clement T.Y. Chan, The University of Texas at Tyler*
The use of synthetic biology to make genetically modified organisms has many applications in the field of medical science. This study aims to engineer new regulatory functions from transcription regulators in the GntR family. A series of GntR family regulators were analyzed to select the best candidates for performing the protein engineering. In this study, sequence homology, biomedical relevance of the inducing molecules, and structural compatibility were considered for selection. After identifying targeted proteins, the genes responsible for desired proteins were engineered with a module-swapping strategy, which can be used to develop novel cellular response pathways. A major goal of this study is to open new avenues to establish synthetic genetic networks that provide a means to address concurrent medical problems and questions.

015.072   G   Characterization of *Salmonella enterica* serotypes Heidelberg and Typhimurium Plasmids from Human Clinical Isolates, *Veronica Elena Rodriguez, Sam Houston State University*
Human salmonellosis is major health issue as it is the most common bacterial food-borne illness in the United States. *Salmonella enterica* serovars Heidelberg and Typhimurium are amongst the top causative agents detected and could cause invasive infections, which requires antimicrobial treatment. To make matters worse, antimicrobials such as cephalosporins, fluoroquinolones, and tetracycline, which are common antibiotics used to treat salmonellosis, may not successfully treat patients since many strains have become resistant to numerous antimicrobials. The spread of multidrug resistance has been due in large part to the transfer of large multidrug resistance (MDR) plasmids across various species of bacteria. The goal of this study is to characterize the plasmid replicon types of 96 S. enterica Typhimurium and 50 S. enterica Heidelberg human clinical isolates obtained from the Texas Department of State Health Services using multiplex PCR. Results show that replicon types A/C, Y, FIIA, FIB, Frep, N, L/M, HI1, and HI2 were detected, with IncA/C types being the most prevalent. These results are significant since MDR IncA/C plasmids are commonly found in Salmonella isolates from cattle, swine, poultry, and in studies observing human clinical isolates. Future research aims to further characterize these plasmids to understand how these plasmids are transferred to other bacteria.

015.073   U   Efforts to Promote Influenza Vaccine Uptake and Education within a Private University's Community of Students and Faculty, *Chesley Burch, Student; Michelle Crum, Professor*
Influenza vaccination within a community is essential in the prevention of severe disease and spread. College students often have an exceptionally low rate of vaccination, and much of this hesitancy has been reported to be due to lack of education regarding influenza prevention. This study examines the barriers to vaccine uptake on a private university campus without a health clinic. The efficacy of measures taken to encourage vaccination of a population within a private university community, including the interest in an on-campus clinic, vaccinations administered and educational measures, is explored. A morning and evening influenza vaccination clinic was organized on campus and held on two separate days, staffed with registered nurses, and located within the university's student center. A population made up of 125 individuals, including students, faculty and staff received vaccines for a nominal fee after promoting the clinic through verbal announcements, emails, flyers and incentives. Out of this group, 73 individuals filled out a short survey form. Female students between the ages 18-20 were the largest group vaccinated (47%) in the study. Freshman students represented about 60% of the participants. Only 25% of all participants were male faculty or staff. From this study we conclude that various factors including education, awareness of clinic, cost of the vaccination and convenience and timing of administration directly affected the vaccination rate in university students.

015.074   U   Evaluation of Effects of Lipopolysaccharides and Alcohol on Neuronal Cells, *Gabriella Tavera, Texas Southern University; Alamelu Sundaresan, Texas Southern University; Maitreyi Chaganti, Texas Southern University; Vivek Mann,*

Texas Southern University
Specific stressors can induce pro-inflammatory mediators, which have been known to cause neurodegeneration and apoptosis in neuronal cells. Understanding the effects of these stressors in neuronal cells and their resulting pathogenesis, could help in identification of novel therapeutic targets to fight these neurodegenerative effects. The stressors that were chosen to carry out this study were Lipopolysaccharides (LPS) and Ethanol. Alcohol intoxication have been known to result in apoptosis of neuronal cells, neurodegeneration, impaired muscle coordination, behavioral changes etc. Similarly, LPS is one of the most common and widely known pro-inflammatory mediator. In this study, we explored the effects of LPS and alcohol on neuronal cells, SH-SY5Y. Also, we investigated whether the LPS and alcohol-mediated inflammatory response can influence the expression of proteins in these cells. To set up this study, the cells were treated with LPS and Ethanol. The cells were then evaluated for cell morphological changes, cell viability, proliferation and proteins were extracted for further analysis. LPS increased proliferation in a time-dependent fashion in the SH-SY5Y Cells. Ethanol caused severe morphological alterations in these cells, changing their adherent properties. Due to this, the cells were in suspension instead of their usual adherent nature and were rounded in shape. This prevented the cells from fully growing and proliferating. Further analysis of proteins extracted from these cells may provide insights into the nature and extent of neurodegeneration caused by LPS and ETAS. This may lead to better understanding of the underlying mechanisms and possible drug targets

015.075   G   **Identification of Bacteria and their Antimicrobial Properties against 5 Multi-Drug Resistant Strains from Soil Samples in the Piney Woods of Texas**, *Caitlyn Mary Gaffney, Sam Houston State University; Florence Onyoni, Sam Houston State University; Aaron Lynne, Sam Houston State University; Jeremy Bechelli, Sam Houston State University*
Antimicrobial resistant bacteria has been on the rise to dangerously high levels all over the world. Each year, more than 700,000 deaths have been attributed to infections caused by antimicrobial resistant microorganisms that cannot be treated with existing drugs. Soil contains millions of various microorganisms, including numerous antibiotic producing bacteria. In this study over 300 bacteria isolated from soil samples were collected and the isolates were tested against safe relatives of "ESKAPE" pathogens as well as multi-drug resistant Salmonella isolates. A total of 32 isolates inhibited a number of MDR Salmonella (Dublin, Choleraesuis, Thyphimurium, Heidberg, and Newport). Isolates were

further investigated by performing a variety of biochemical tests. Simple organic extraction using ethyl acetate was performed to isolate the potential antibiotics. Through the biochemical tests and organic extractions, 30 unique isolates were selected and subjected to PCR and sequencing of the 16s rRNA gene. The results showed majority of isolates were various species belonging to Pseudomonas and Flavobacterium. Future work includes whole genome sequencing of bacterial isolates and identification of antimicrobial compounds.

015.076   U   **Processing and Culturing of Human Dermal Cells from Primary Tissue**, *Ashley Ann Perez, Del Mar College; Rebecca Downen, Del Mar College*
Authors: Rebecca Downen, Ashley Perez, Dr. Wei Xu, Sandra Marbach; Del Mar College, TAMU-CC; Human Dermal Fibroblasts (HDF) are cells found in the dermis of the skin. They play a massive role in producing the extracellular matrix that forms the connective tissue of the skin, while also having a very crucial role during wound healing. The cells can be used in applications such as tissue engineering and remodeling, burn treatments, and in research regarding psychiatric disorders, such as schizophrenia, bipolar disorder, ADHD, etc. Human Epidermal Keratinocytes (HEK) are cells found in the epidermis of the skin and are the most abundant there. These cells obtain melanin from melanocytes (HEM) and store it as protection from ultraviolet radiation and can also protect the body from other environmental damage such as heat, water loss, pathogenic bacteria, etc. The purpose of this research is to create primary HDF and HK cell lines from primary tissues that were given by the Cooperative Human Tissue Network. The cells that come directly from human tissues offer opportunities to not only study cells themselves, but to also study donors. There are several factors that can be considered when working with primary tissues to create experimental models, such as age, race, and sex of donors. With personalized medicine becoming a major advancement in the medical world, the donor viability and tissue complexity can only be achieved with these primary samples instead of using a systematic cell line that does not offer the true diversity of the patients living tissue.

015.077   N   **Quantum mechanical studies of new inhibitors of xanthine oxidase**, *Chao Dong, The University of Texas of The Permian Basin; Sophealyta Kheang, The University of Texas of The Permian Basin*
Gout is a chronic, inflammatory condition due to slow urate metabolism. The xanthine oxidase inhibitors, such as allopurinol and febuxostat, are recommended to reduce the uric acid level and prevent gout to attack in adult patients. The emerging new generation of xanthine inhibitor, FYX051, displays a high cost

effectiveness compared with febuxostat therapy in chronic gout patients. However, the metabolites of N-oxides from FYX-051 (Topiroxostat) could potentially have adverse effect on patients with severe renal impairment if they have been taking an oral injection for a long period of time as shown in the report on the deliberation results for evaluation of FYX051 (Topiroxostat). Therefore, it is desirable to design new inhibitors without 1,2,4-triazole C=N components. Here, we computationally designed several modified inhibitors with 1,2,4-triazole ring being replaced by furan, thiophene, pyrrole, selephene. The quantum mechanical computational method is performed to obtain thermodynamic properties (ΔH^o, ΔS^o and ΔG^o) of these FYX051 derivatives, which is employed to evaluate the binding energy of new inhibitors with xanthine oxidase active site. In addition, the new designed inhibitors will also help to probe the protonation state of glutamate 832, which is proposed to contribute the energy stabilization of inhibitors by hydrogen bonding.

015.078　U　**Anti-proliferative activity of recombinant disintegrins r-mojastin and r-viridistatin on human pancreatic carcinoma (BXPC-3) cells**, *Amber Sky Alaniz, Delmar College*
The pancreas is a very important organ in the body that plays more than one role in bodily function. The pancreas releases digestive enzymes that help break down protein, fat and carbohydrates and hormones like insulin, glucagon and somatostatin that regulate the glucose levels in blood and cells. Pancreatic cancer is ranked number four in cancer related deaths in the western countries. In 2010 there were 43,140 new cases and 36,800 deaths from pancreatic cancer. The only "cure" for pancreatic cancer is having surgery. Unfortunately, only about 20% of people diagnosed have the option of surgery. About only 10% of those who can have surgery go on to live for 5 years. There is chemotherapy, however, chemotherapy may only shrink the tumor. The discovery of new therapeutics is of great interest to many researchers. Disintegrins are a family of small proteins (45–84 amino acids in length) from viper venoms that function as potent inhibitors of both platelet aggregation and integrin-dependent cell adhesion. The purpose of this research was to study the anti-proliferative activity of two recombinant disintegrins (r-mojastin 1 and r-viridistatin 2) on Human Pancreatic Carcinoma (BXPC-3) cells. r-mojastin 1 and r-viridistatin 2 were found to inhibit many factors of BXPC-3 cells including migration, proliferation, adhesion, and induced apoptopsis. r-mojastin 1 and r-viridistatin 2 showed that the combination of both disintegrin enhanced the inhibitory effect with a similar potency compare to doxorubicin. Our disintegrin alone and combined were had greater results of inhibition when compared to taxol.

015.079　U　**Characterizing cell proliferation and migration phenotypes of mutagenized MEF cells and tumorigenic A9 cells**, *Reshma Mariam Varughese, Austin college*
Cancer is a collection of diseases best defined by the deregulation of a cell's biology to promote uncontrolled proliferation. The progression of this tumorigenic behavior is primarily driven through the accumulation of mutations that promote the cell's ability to proliferate and ultimately allow the cell to colonize distant tissues in a process known as metastasis. In order to better understand the process of tumorigenesis, we have taken mutagenized MEF (mMEF) cells and investigated their genetic stability and capacity to proliferate, and then compared these data to those of tumorigenic A9 cells. In doing so, we hypothesized that the mutagenizing the MEF cells would result in their exhibiting behavior similar to the tumorigenic A9 cell line. Propidium iodide staining indicated that mMEF cells progressed faster through the cell cycle than A9 cells, and the mMEF cells were found to have an increased capacity to migrate via transwell assay. However, scratch assays contradicted this data with the A9s moving farther into the scratch than mMEF cells. The mMEF cells were found to have missense mutations to both the gene encoding p53 and the one encoding akt1, which have roles in the regulation of the cell cycle. Overall, these data support the importance of deregulation of cell proliferation and promoting invasion in tumorigenesis; however, the observed difference between our mMEF cells and A9 cells indicate that the ways cancer goes about this can vary significantly.

015.080　U　**Identification of Antibiotic Resistant *Morganella morganii* and it's Bacteriophage**, *Rodney Ray Cantu, Del mar college*
For eighty years, antibiotics have been discovered and used to treat bacteria infection and increased significant antibiotic resistant strains alone the way. An antibiotic resistant bacterium was isolated using soil sample collected from south Texas farmland.　Using colony PCR, 16s rRNA gene was amplified and later sequenced. Bioinformatics analysis identified this bacterium as *Morganella morganni*, a micro flora bacterium that lives in the gut of mammals and reptiles and has been proved to be pathogenic in some studies. The soil sample collected from the same location was enriched using *Morganella morganni* and then used for phage assay.　A novel bacteriophage was discovered and proved to be lysogenic for its host bacteria.　The study shines a light on possibility to use phage to treat infections caused by *Morganella morganni* strains.

015.081　G　**Interactions of autophagy with Colorado tick fever virus in African green monkey kidney (Vero) cells.**, *Amber Woody, Sam Houston State University; Sarah Owen, Sam Houston State*

University; Jeremy Bechelli, Sam Houston State University
Colorado tick fever virus (CTFV) is a non-enveloped double stranded RNA virus with a 12 segmented genome and is in the Family *Reoviridae* and genus *Coltivirus*. This virus is the causative agent of Colorado tick fever, which has symptoms that include a characteristic biphasic fever, headache, myalgias, photophobia, and in some pediatric cases a petechial rash. Death, while rare, has been documented in children and attributed to hemorrhagic fever and meningoencephalitis. Approximately 20% of all patients require hospitalization, highlighting CTFV as a virus of significant interest. Autophagy is normally brought on by stress, specifically starvation, reactive oxygen species, or energy depletion, that results in the formation autophagosomes to degrade cytoplasmic contents for energy. Furthermore, autophagy can be used to facilitate viral clearance in a process called xenophagy. Several viruses in the Family *Reoviridae* have been shown to exploit autophagy to facilitate viral replication. Our preliminary data show that CTFV infected Vero cells forced to undergo autophagy using rapamycin, a potent pharmacological inducer of autophagy, show significantly enhanced viral titers at 48 hours post infection. We hypothesize that inhibiting autophagy with 3-MA will reduce viral titers. Flow cytometry will be used to assess the kinetics of CTFV induced autophagosome formation. Based on our preliminary data, treatment with rapamycin significantly increased the concentrations of CTFV in Vero cells compared to those in the untreated controls, suggesting that autophagy serves to enhance viral replication and facilitates viral pathogenesis.

015.082   U   **Investigating carcinogenesis in early and late stage cancer cell lines**, *Tajal Patel, Austin College; Alisa White, Austin College; Brian Ngyuen, Austin College; Lance F. Barton, Austin College*
Cancer is defined as a family of diseases that results from aberrations in normal cell function. For example, genetic and genomic instability are aberrations derived from mutagenesis or accumulation of mutations with implications on cell cycle progression, proliferation, and migration. The mutagenesis process was used to generate wild type cancer clone (WTCC) cells, which can be compared to the 4T1 cell line, an aggressive cell line derived from stage IV mammary tumors in mice. In this study, we compared the carcinogenic properties of WTCC cells in comparison to 4T1 cells to determine whether or not the mutagenesis process of the WTCC cell line was sufficient to generate an aggressive cancer cell line similar to the 4T1 cell line. Carcinogenic properties investigated included the following hallmarks of cancer: evading growth suppressors, sustained proliferative signaling, genetic and genomic instability, invasion and metastasis, and resisting cell death. Cell proliferation properties were studied through flow cytometry, indicating alterations in cell cycle progression and cell proliferation of the 4T1 cells. The scratch assay and transwell migration demonstrated increased invasive properties in the 4T1 cells compared to the WTCC. In addition, a mutation in the src gene of the 4T1 cells was identified, demonstrating genetic instability in the cancer cell line. Results supported that the 4T1 cells demonstrated 5 out of the 10 hallmarks of cancer as well as enhanced carcinogenic properties compared to the WTCC.

015.083   U   **Isolation and Characterization of Bacteriophage 'Elkia'**, *Robert James Balarin*
Bacteriophage are the most numerous life-forms on Earth, whose numbers are estimated to exceed 1031. Recently, phages have been tested for gene therapy and successfully used in treatment of some antibiotic resistant bacterial infections. In this experiment a soil enrichment protocol was used to isolate a novel bacteriophage named 'Elkia' for Mycobacterium smegmatis. Phage lysates were harvested for DNA Isolation. The genomic DNA of Bacteriophage 'Elkia' was digested by five restriction enzymes to attempt to classify it to a certain cluster. 'Elkia' was natively stained using uranyl acetate and imaged by a transmission electron microscope (TEM). The TEM images suggested 'Elkia's morphology as Myoviridae with estimated measurements of its capsid diameter of 50 nm and tail length of 200 nm. All data of 'Elkia' is archived in PhagesDB. Mycobacterium smegmatis was chosen as the host for this study because it is a close species to Mycobacterium tuberculosis. Thus, the discovery and study of 'Elkia' may contribute to the development of phage treatment for tuberculosis.

015.084   U   **Screening and Isolation of Cancer Cells containing CRISPR Deletion of PA28γ**, *Priya Shah, Austin College; Emily Aller, Austin College; Varun Kotipalli, Austin College; Michelle Ramirez, Austin College; Jessica Hoffman, Austin College; Brittany McMillen, Austin College; Lance F. Barton, Austin College*
One defining hallmark of cancer is characterized by uncontrolled cellular proliferation and by interruption of signaling growth pathways. One possible gene implicated in uncontrolled cellular proliferation may be PA28γ. This gene has shown high levels of expression in cancers, but studies have shown that knocking down PA28γ in cancers containing elevated expression may lead to a slower progression of cell growth. The CRISPR Cas9 genome editing tool was utilized to create a homozygous and partial heterozygous knockout of PA28γ in four murine cell lines that exist at varying stages of carcinogenesis. The goal of this project was to confirm the deletion of the PA28γ gene that was

performed using the CRISPR Cas9 genome editing tool. A9, LL2, 4T1, and EPH4 cell lines were screened and isolated for the homozygous knockout of PA28γ gene. The screening was carried out using a combination of identification steps: PCR, T7E1 digestion, and Western blotting. The cells that acquired a double edit of the gene and did not express PA28γ were collected and frozen down for future use.

015.085   U   The Potential Role of Dynactin in the *Drosophila* Toll Signaling Pathway, *Beatriz Belchior Pereira, Schreiner University; Brittany Louise Martinez, Schreiner University; Susan Louise Klinedinst, Schreiner University*
Toll-signaling is a major component of innate immunity, which is a system that provides the first response to an immune challenge. In *Drosophila melanogaster*, an immune challenge stimulates Spätzle to recognize a pathogen-associated molecular pattern and bind to the Toll receptor. Toll then forms a complex with dMyD88, Tube, Pelle, and Dorsal. This complex initiates the degradation of Cactus by phosphorylation, which in turn causes the nuclear translocation of Dorsal carrying the signal necessary to trigger an immune response against the infection. Because Dynactin acts as a carrier or transporter molecule, it is possible that it is responsible for the nuclear translocation of Dorsal. To test this, Drosophila Dynactin mutants will be challenged by being pricked with a needle in order to stimulate an innate immune response. These mutants will then be examined under a fluorescent microscope to qualitatively compare the amount of Dorsal protein found in the nucleus in the unchallenged vs. challenged larvae. An abundance of Dorsal protein in the cytoplasm and not the nucleus of challenged mutant larvae would support the hypothesis that Dynactin is required for the nuclear translocation of Dorsal.

015.086   U   The search for insect-specific toxin sequences in the southern black widow spider, *Angel David Nunez Correa, Stephen F. Austin; Lindsay M Porter, Stephen F. Austin State University*
The southern black widow spider, *Latrodectus mactans*, is an extremely venomous spider that produces several types of toxins including toxins with activity specifically against insects (latroinsectotoxins, LITs). This species is normally found in the southern parts of the United States, including in Nacogdoches, TX. Currently, there are no sequences for LITs from *L. mactans* in publically available databases. In this study, we used available primer sets for two types of LITs, alpha and delta, originally designed for a different widow species, to attempt to amplify and sequence these LITs in *L. mactans*. Based on *in silico* homology analysis that included multiple widow species, primer sequences in putatively conserved regions were

selected. Total RNA was extracted from locally-acquired black widows and cDNA was synthesized for use in PCR. We screened a total of eight primers for alpha toxin and nine for delta toxin, with two primer sets generating amplicons that were purified and sequenced. Results of sequencing are discussed. The discovery of insect-specific toxin sequences would allow for their investigation as environmentally-friendly biopesticides.

015.087   U   The Synergistic Effects of Manuka Honey and Gentamicin on *Pseudomonas aeruginosa* and *Staphylococcus aureus*, *Samuel Kenyon, St. Edward's University; Patricia Baynham, St Edward's university*
Antimicrobial resistance is increasing, which could lead to increased deaths or other serious conditions due to lack of effective treatment. If the current antibiotic treatments continue to fail, deaths from antibiotic resistant infections could rise from 23,000 per year to over 10 million. Honey has been used to treat wounds and prevent infection for millennia, and as such research on the efficacy of ancient and holistic remedies has become more prevalent. Manuka honey has been found to have potent antibacterial activity. This experiment sought to better understand any synergistic relationships between manuka honey and common antibiotics that might be used against common skin and wound pathogens such as Staphylococcus aureus and Pseudomonas aeruginosa. Sterile manuka honey wound gel was obtained from Dermisciences. Antibiotic-resistant strains of S.aureus and P. aeruginosa were obtained from the CDC, and lab standard strains were also used. Agar spot plate Minimum Inhibitory Concentrations(MIC), Kirby Bauer Disk Diffusions, and checkerboard dilutions were run. The Agar spot plate MICs suggested manuka honey's MIC for S. aureus to be 5%. The Kirby Bauer disk diffusions showed that the resistant strains were not affected by the antibiotics or honey treatment, but the P. aeruginosa standard strain showed zones of inhibition. Gentamicin was selected to continue with checkerboard dilutions to quantify synergy against P. aeruginosa. The checkerboard dilutions suggested that manuka honey and gentamicin display synergistic or additive properties. Manuka honey is a promising candidate for new synergistic treatment options, which would help to combat antimicrobial resistance.

015.088   U   TRAF in *Amblyomma americanum*, *Javquelyn May, Stephen F Austin; Lindsay M Porter, Stephen F. Austin State University*
Expression analysis and RNAi silencing of an immune gene in the lone star tick The lone start tick is an aggressive tick species, readily biting humans and a vector of disease-causing pathogens of public health importance. Despite its known role in vectoring

bacterial pathogens, how this species responds immunologically to bacteria is not well known. In this study, we investigated a gene previously shown to be responsive to LPS, Tumor Necrosis Factor Receptor Associated Factors (TRAF) that has been validated as immune-related in other arthropods. We analyzed expression of this gene before and during gram-negative and gram-positive bacterial infection in both male and female ticks. We also prepared expression constructs for the in vivo production of dsRNA for RNAi. We find that expression is ubiquitous and does not appear to be more abundant throughout 24 h of infection in qualitative PCR analysis. The effects of silencing on hemocyte response and on infection load are discussed. It is important to understand the way ticks react to non-pathogenic bacteria in order to eventually look into how they respond to human pathogens. Eventually this could lead to being able to manipulate the genes in order to control these vectors.

015.089   U   **Condition Place Preference as an assay for nicotine search behavior in zebrafish**, *Daisy Vargas, University of Texas at Tyler; Ahmira Manalac, University of Texas at Tyler; Norma Perez-Garcia, University of Texas at Tyler; Maria Alejandra Rivero, University of Texas at Tyler; Vanessa Rosado, University of Texas at Tyler; Ayman Hamouda, University of Texas at Tyler; Brent R Bill, University of Texas at Tyler*

Nicotine is a psychoactive component of tobacco and one of the most widely used drugs. Nicotine addiction is the fundamental reason that individuals persist in using tobacco products, and this persistent tobacco use contributes to many diseases and kills more than 7 million people every year. An estimated 46.5 million Americans smoke, of these, 70% want to quit completely and each year, about 17 million adults in the United States make a serious attempt to quit. Currently, five agents have been approved by the FDA for smoking cessation: four nicotine replacement preparations (nicotine gum, transdermal nicotine patches, nicotine nasal spray, and nicotine inhaler) and sustained-release bupropion hydrochloride. However, these products are associated with many serve sides effects and a 75% failure rate. Nicotine has a well-established, yet complex role in activating the reward system and encouraging a reward seeking behavior. Condition place preference is a common assay for assessing seeking behavior. Previous work has demonstrated that zebrafish seek nicotine in 2-, 3-, and 5-chamber models. As part of our work to develop assays to assess drugs of cessation, we have attempted to replicate the three chamber (20 Liter) model; however, variability of fish responses negated any affects that were observed.   We conclude that this model may be too cumbersome for our purposes. We have completed constructing the two-chamber model

and future work will focus on replication and assessment of this 2-chamber model.

015.090   U   **Review of Transcriptional modulation in Autism Spectrum Disorder.**, *Zoe R. Williams, University of Texas at Tyler; Bethany M Woolman, University of Texas at Tyler; Brent R Bill, University of Texas at Tyler*

Autism Spectrum disorder (ASD) is a behavioral diagnosis given to individuals that have difficulties with social communication and have restricted interests or repetitive behaviors. One to two percent of children are diagnosed with ASD making it a major health and educational concern. Approximately 200 genes are associated with ASD; however, their role in neurologic development has not really been understood. The goal of our study will be to look at the role of transcriptional regulation in ASD. We are conducting a literature review of all such genes, and then will focus on a bioinformatic analysis of two specific examples that have only recently been implicated, *AHDC1* and *STOX2*. Previous work on transcriptional regulation has been focused on epigenetic regulation with the most published example being *MECP2* with over 300 publications. Future work will focus on reverse genetic approaches to determine *AHDC1* and *STOX2*'s neurologic impacts using the zebrafish as model system.

015.091   U   **The Effects of Acute Nicotine Exposure on Anxiety in Zebrafish**, *Norma Perez-Garcia, University of Texas at Tyler; Maria Alejandra Rivero, University of Texas at Tyler; Ahmira Manalac, University of Texas at Tyler; Daisy Vargas, University of Texas at Tyler; Vanessa Rosado, University of Texas at Tyler; Ayman Hamouda, University of Texas at Tyler; Brent R Bill, University of Texas at Tyler*

Nicotine is known to be a highly addictive drug that is found within tobacco products and nearly in all E-cigarettes. Research has shown that nicotine is as addicting as alcohol, heroin, and cocaine, and those who consume or use tobacco products become addicted to nicotine and have a hard time quitting. Nicotine is known to reduce anxiety and stress levels acutely, but there are long-term side effects when trying to stop smoking (cessation). Tobacco users and e-cigarette users have a 75% relapse rate even with current cessation treatments. Nicotine cessation screening approaches utilize murine models that are expensive and time consuming; therefore, our goal is to operationalize the zebrafish as a cheaper and quicker model for primary cessation drug screening. We replicated the adult zebrafish novel tanks test, an assay for anxiety. Zebrafish are exposed to nicotine for 3 minutes, rinsed for 5 minutes, and placed into novel testing tanks. They are recorded to observe time spent in either the bottom third or top third of the tank.

Anxiety is indicated by spending a disproportionate time in the bottom third of the tank. We have assessed tank substrate, wall color, light levels, and dosages. We are trying to optimize for tracking conditions using Ethovision software and maximizing the effects of Nicotine. Our goal is to compare anxiety behavior in the presence of Varenicline and other novel cessation drugs.

015.092   U   Analysis of West Texas Owl Species and Their Feeding Habits in both Runnels and Jones Counties, *Kayli Briannon Pendley, Hardin Simmons University; Wendi K Wolfram, Hardin Simmons University*
There are five species of owls native to West Texas, the Burrowing Owl (*Athene Cunicularia*), Great Horned Owl (*Bubo Virginianus*), The Barn Owl (*Tyto Alba)*), and occasionally species including the Eastern Screech Owl (*Otus Asio*), and Barred Owl(*Strix Varia*). Owls feed on a number of small mammals, to include small voles, shrews, mice and rats, such as the Plains Pocket Gopher (*Geomys*), Merriam's Pocket Mouse (*Perognathus Merriami*), Hispid Cotton Rat (*Sigmodon Hispidus*) , and South Plains/ White Throated Woodrat (*Neotoma*). In order to better understand regional diets in both Jones and Runnels counties we set up video recording equipment, conducted visual observations, and collected owl pellets for prey identification and DNA analysis. Preliminary data confirms the presence of *Tyto Alba* and we expect the processing of collected specimens to contain the species of Rodentia listed above.

015.093   U   Carolina Wren nest success and nestling condition in urban and rural habitats, *Sara Lynn Moore, Sam Houston State University; Diane Neudorf, Sam Houston State University*
As urbanization claims more and more natural habitat, it is important to understand how native wildlife is adapting to these habitat changes. The Carolina wren (*Thyrothorus ludovicianus*) is an excellent model species to understand how well birds are surviving in urban environments. These small birds are insectivorous cavity-nesters, which leaves urban habitats potentially lacking in sufficient resources for the wrens. We compared wren nesting success and the body condition of nestlings in rural (more food sources, less disturbance) and urban (less food sources, more disturbance) habitats. We weighed and measured nestlings at day 6 and day 9 of the nestling period and calculated the overall body condition (tarsus over mass) for nestlings in each habitat. Overall, we measured a total of 20 nests, 8 in the urban habitat and 12 in the rural habitat. We expected to find that urban nestlings had poorer body condition than rural nestlings, however, we did not find a significant difference between the two populations. The urban habitat we

studied may provide sufficient food resources for wrens but further study is needed.

015.094   U   Chemosensory Signaling: Behavioral Interactions on Interspecific Competition Between Gray Fox (*Urocyon cinereoargenteus*) and Red Fox (*Vulpes vulpes*), *Dejah Braxton, Hardin-Simmons University; James Taylor, Hardin-Simmons University; Laura Bennett, Hardin Simmons University; Moses Zirimwabagabo, Hardin-Simmons University; Wendi K Wolfram, Hardin Simmons University*
Gray Fox (*Urocyon cinereoargenteus*) and Red Fox (*Vulpes vulpes*) populations range throughout the United States. Gray fox are a native species to Texas while red fox is a non-native species. Both species inhabit densely wooded areas and open grasslands. Using the same habitats can result in interspecific competition between the native and non-native species. Competition such as this between two species presents a host of issues for the native gray fox to include the establishment of territories and home ranges. Both species of fox use scent-marking to communicate and define territory boundaries. In this study, we look at territorial boundaries presented by red fox urine and the impact of these urine scent stations on the behavior of gray fox. We expect to see a negative response from the gray fox in relation to the presence of red fox urine samples.

015.095   U   Further Exploration into the Nesting Success of the Carolina Wren, *Gabriel Barragan, University Student; Diane Neudorf, Sam Houston State University*
More than 50% of wildlife habitats have been altered or lost in Texas, and one of the leading causes of this loss is urbanization. Urbanized habitats present birds with different challenges from those of natural areas. Foraging areas may be limited due to less natural vegetation. Human disturbances such as pollution may impact foraging behavior, nestling feeding and predator risk. These differences may impact the reproductive success of birds in urbanized ecosystems. Carolina Wrens (*Thyrothorus ludovicianus*) are resident, cavity-nesting songbirds of the eastern United States that inhabit both forest ecosystems and urban ecosystems with large trees. Over an eight year period we erected nest boxes in both the City of Huntsville, TX and the Sam Houston State University field station to compare nesting success of wrens in the two areas. We found that the first egg date did not differ between the urban and rural ecosystems. Rural birds had larger clutches but not higher nesting success probably due to a higher predation frequency in rural habitats. For species like the Carolina Wren, some urban habitats may allow for improved nesting success due to lack of nest predators, although further study is needed.

015.096   U   **Life history and reproductive dynamics of the Phantom Tryonia (Gastropoda)**, *Christina Josephine Ortega, University of Texas Rio Grande Valley; Melissa Anna Lopez, University of Texas Rio Grande Valley; Salma Ruiz, University of Texas Rio Grande Valley; Weston Nowlin, Texas State University; Kathryn Perez, University of Texas Rio Grande Valley*

The purpose of this study is to determine the life history of the Phantom Tryonia (*Tryonia cheatumi*), a federally listed endangered species found in a small group of West Texas springs near Balmorhea. Conservation and recovery efforts require background information on the biology of organisms, information that is lacking for poorly known invertebrates such as snails. Samples from all three known populations of this snail were collected seasonally over a two-year period. All sampled snails from each population were measured (*n*=2,766) and size information was used to provide a rough estimate of seasonal patterns in reproduction and recruitment. The smallest size classes are most common in summer and fall, indicating that this species likely reproduces seasonally. Snail shell and aperture height and width were measured in micrometers using a stereoscopic microscope and Infinity Analyze and Capture Software using a set calibration protocol. Our next steps will be to examine sex ratio and reproductive effort in this live-brooding snails by counting snails held in the female. These information on seasonal life history patterns will inform conservation and management efforts at San Solomon springs to help prevent this species extinction.

015.097   U   **The Effects of the Reintroduction of Native Grasses on Native Bird Populations in West Texas**, *Francisco A Velasco, Hardin Simmons University; Bryson T Holcomb, Hardin Simmons University; Jessica Moody, Hardin Simmons University; Laura Bennett, Hardin Simmons University; Wendi K Wolfram, Hardin Simmons University*

There are many species of bird that live in the grasslands of West Texas. These native birds often rely on the native and non-native grasses in this area. They forage these grasses and also use them when building nests. The native grasses: Side Oats Gramma (*Bouteloua curtipendula*), Big Bluestem (*Andropogon gerardii*), Little Bluestem (*Schizachyrium scoparium*), and Indian Switchgrass (*Sorghastrum nutans*), have been reintroduced into the ecosystem after land development for farming and agriculture drove them out. We believe that the birds will show preference when choosing which grasses to both nest and forage. We believe that the reintroduction of the native grasses in the area have a positive impact on the birds that nest and forage them. Species of bird are being identified by their song through the use of sound recorders, and sound processing software. Preliminary data for species

within the reintroduction area include but are not limited to: the Northern Mockingbird (*Mimus polyglotttos*), White Crowned Sparrow (*Zonotrichia leucophrys*), Yellow Rumped Warbler (*Setophaga coronata*), American Robin (*Turdus migratorious*), and the Blue Jay (*Cyanocitta cristata*).

015.098   U   **The Effects of Water Quality Through Contamination from Water Developments on Livestock and Wildlife**, *Michaela Gephart, Hardin Simmons University; Megan Moore, Hardin Simmons University; Adrianna Simpson, Hardin Simmons University*

High water quality is required for humans, wildlife and livestock in order to be healthy. Health impacts can affect life through man-made water resources and natural water resources. There have been few studies conducted on water quality and the concerns involved with wildlife and livestock. Due to this, the level of concern is unknown, therefore long term studies are needed to determine the impacts. This study is being conducted in West, Texas at two ranch locations in Runnels and Taylor county. The ranch locations being studied have a variety of water resources for wildlife and livestock, and are located in two separate counties. The water sources include tanks and creeks that are on the properties. The study will provide information to improve water quality and water developments in the future. Results of this study can be used to identify methods to aid in cost reductions, the conservation of wildlife, and in land management practices.

015.099   U   **Comparison of water quality between Leon Creek and Medina River downstream of the Leon Creek Water Recycling Center**, *Justin Nathaniel Ramirez, CIMA*

Effluent from wastewater treatment plants can impact water quality of aquatic ecosystems either due to the presence of legacy pollutants or from the water treatment process itself. The purpose of this study was to evaluate the impact of wastewater effluent discharge on an aquatic ecosystem. We conducted water quality tests in San Antonio, Texas at Leon Creek and Medina River at South Flores Road, which are sites located upstream and downstream of the Leon Creek Water Recycling Center (WRC), respectively. Our water quality tests suggest similarities in microbial communities between sites, but pH, nitrate, and total phosphate levels were higher in Medina River at South Flores Road. These water quality impairments could be caused by wastewater effluent discharge from the Leon Creek WRC, agricultural runoff further upstream along Medina River or possibly a combination of both land use activities.

015.100   U   **Examining the human element of the central Texas zebra mussel invasion**, *Tyler Wilson, Temple College; Jason L Locklin, Temple*

College; Phillip Greco, Temple College
Zebra mussels are an invasive species native to the Black and Caspian Seas. They were introduced to the Great Lakes by the bilge water of cargo ships and spread to hundreds of water systems in the US, including Lake Belton in Bell County, Texas. They can cause ecological and municipal damage due to their rapid rate of proliferation and high rate of filter feeding. Though there have been efforts to educate the public of the damage zebra mussels can cause, they continue to be spread by fishing and recreational boaters. The purpose of this study was to measure the effectiveness of the educational efforts relative to visitors of Lake Belton. Visitors were surveyed to assess their awareness of zebra mussels and the potential harm they could cause. Results of this study indicate that the majority of those surveyed were both aware of zebra mussels and the threat that they pose.

015.101   U   *Cambarellus shufeldtii* subhabitat selection in an experimental environment setting, *Neil Ford, UT Tyler Biology; Luke Cunningham, University of Texas at Tyler; Sam J Cunningham, UT Tyler*
Cambarellus shufeldtii, commonly known as the Cajun Dwarf Crayfish, is a freshwater crayfish that is native to the lower southeastern United States especially found in the river basins and floodplains. It is reported in the literature to be versatile in its habitat selection but commonly observed in ditches and swamps with standing water. Our group investigated the subtype of environment the Cajun Dwarf Crayfish would frequent the most if presented with the following subhabitat options: rock subhabitat, stick subhabitat, sand subhabitat, and gravel subhabitat. A total of fifteen crayfish were placed in specially designed aquariums providing access to each of the four habitats and allowed time to acclimate to their environment. Through the methods of the experiment, it was noted that the crayfish were observed in the stick subhabitat most frequently. The observed affinity for the stick subhabitat by the Cajun Dwarf Crayfish has not been noted previously in the literature. The findings of this experiment will help scientists locate and observe the behaviors of this crayfish in nature.

015.102   N   Crime can incur penalties: Sticky stigmas trap nectar thieving ants, *Richard James Wilson Patrock, TAMU-Kingsville, Dept. Biological and Health Sciences and NRCS, Kingsville; Shelley Maher, USDA/Natural Resources Conservation Service; John Reilley, USDA/Natural Resources Conservation Service*
Nectar is good food for many animals but its presentation is a cost to the plant. In a perfectly fair biological universe, the animal taking advantage of this food would return some favor. Typically we view

pollen movement as a fair return to the plant. Where this does not occur, we consider this nectar thieving. In this study, we looked at nectar robbing in two ornamental plants in the Coast Bend area of Texas: esperanza, (*Tecoma stans*, Bignoniaceae) and yellow oleander, (*Cascabela thevetia*, Apocynaceae). We followed general levels of this activity on esperanza over a five year period from 2014-2019. In late summer of 2019 we found bees robbing yellow oleander and began a more concentrated study on this plant. Examining floral scars left from the robberies, we found ants stuck to stigmas and anthers of the flowers. Since our flowers had been taken from the ground, we were unsure as to whether the ants had entered the flowers in vivo or after they had fallen. We then examined flowers remaining on the plants, as well as those on the ground. We inferred from our subsequent observations that some species of ants were likely to have been 'grave robbers' but others were found glued in flowers retained on the plant; imprisoned while in the act of thievery.

015.103   U   Differentiation of *Eleutherodactylus cystignathoides* and *E. marnockii* on the basis of call parameters, *Rebecca T Chastain, Southwestern University; Benjamin A Pierce, Southwestern University*
Eleutherodactylus cystignathoides and *E. marnockii* are closely related chirping frogs with historically nonoverlapping ranges in Texas. Over the last fifty years, *E. cystignathoides* has expanded beyond its native habitat in the Rio Grande Valley region and has now been documented throughout East and North Texas, as well as in Louisiana and Alabama. *E. cystignathoides* has been reported in some areas of the Edwards Plateau, including within the native range of *E. marnockii*; this has created an identification problem because the two species exhibit considerable overlap in appearance and have similar, chirp-like calls. Our research focuses on determining the current range of each species in Texas and investigating potential interactions between the two species. We synthesized data from a variety of sources, including research literature and iNaturalist entries, to create current range maps of each species and to determine periods of calling. We analyzed call recordings taken from areas known to be home to only one species to determine whether they can be differentiated in the field on the basis of call parameters, particularly highest and lowest frequency, frequency at highest amplitude, and call duration. Preliminary analyses indicate that the two species differ significantly in average highest and lowest frequency as well as frequency at highest amplitude, but not in average call duration. These results suggest that calls can be used to better document the range and distribution of *E. cystignathoides* and differentiate it from *E. marnockii* in areas where the

two species potentially coexist.

015.104   U   Elevated CO$_2$ levels impact imported fire ant (*S. invicta*) behavior relative to the Texas-native harvester ant (*P. barbatus*), *Michael Joseph Klein, Concordia University Texas; Shane Hoelting, Concordia University Texas; Axel Banuelos, Concordia University Texas; Shana Park, Concordia University Texas; Mary Johnston, Concordia University Texas*

Increased anthropogenic carbon dioxide from climate change is known to disrupt certain physiological processes for organisms. Increasing carbon dioxide exposure for specific marine species has disrupted the chloride ion fluctuations within the GABAA receptors which has been linked to increased anxiety. We hypothesize that increased levels of carbon dioxide will disrupt the chloride ion flow within GABAA receptors, leading to higher levels of anxiety in insects. This experiment examines the predator response behaviors of *Solenopsis invicta* (fire ants) and *Pogonomyrmex barbatus* (harvester ants) in ambient and elevated environments of carbon dioxide. We tested our hypothesis by using a 2x2 factorial experimental design, investigating the impacts of increased carbon dioxide on initial velocity (before predator introduction), final velocity, and turn performance (after predator introduction) of both *S. invicta* and *P. barbatus*. Here, we show that responses to increased carbon dioxide are species specific. *S. invicta* move at significantly lower velocities in the presence of a simulated predator compared with *P. barbatus*. Additionally, *P. barbatus* performed significantly more 180-degree turns in the experimental arena relative to *S. invicta*, both in ambient and CO$_2$ enriched environments. As carbon dioxide levels continue to increase in the atmosphere due to fossil fuel emissions, these results show that *S. invicta* do become more anxious in elevated CO$_2$. These results support our hypothesis that *S. invicta* that are exposed to increased carbon dioxide, experience chloride ion fluctuations within their GABAA receptors.

015.105   U   Excess animal fat suppresses *Sorghastrum nutans* growth and microarthropod abundance, *Rebekah Mullins, Concordia University Texas; Heather Kalenak, Concordia University Texas; Jennifer Gallardo, Concordia University Texas; Emily Richter, Concordia University Texas; Mary Johnston, Concordia University Texas*

Studies have shown that direct and indirect anthropogenic food subsidies have greatly impacted ecosystems, communities, and animal health. Farm and ranch supplements to animal diets may increase fat content to both domesticated animals and local wildlife. Following death, the process of decomposition then inputs those additional fats into the ecosystem. In this study, we evaluated the effects of increased animal flesh fat content on plant growth and soil arthropod communities. We used a fully randomized block design for each of our experiments with 8 replicates for each of four levels of fat addition, including a control treatment. Our plant growth experiment used the Texas native *Sorghastrum nutans* (Indiangrass). Our soil arthropod experiment was conducted in 30cmx30cm plots, and organisms were harvested 3 weeks after treatments were applied. Indiangrass growth rate tended to be lowest at the highest levels of fat subsidies. In our plots, soil arthropod Shannon diversity was highest in control plots and mid-levels of fat addition. Additionally, plots with control and mid-level fat subsidies had a significantly greater variety of arthropod communities as revealed by multivariate PC analysis. This study, though of a limited scope, reveals that high levels of fat subsidies negatively impact plant growth, though mid-level fat inputs are indistinguishable from zero additions. This study raises questions of how our lifestyle can affect the overall ecosystem.

015.106   U   On the Diversity of Erosion Control Products: Implications for Snake Entanglement., *Kasey L. Jobe, Stephen F. Austin State University; Nicholas C. Schiwitz, Stephen F. Austin State University; Krista J. Ward, Stephen F. Austin State University; Daniel Saenz, U.S. Forest Service; Christopher M. Schalk, Stephen F. Austin State University*

The negative impacts of roads on biodiversity are well known. Roads fragment habitat and cause mortality via wildlife-vehicle conflicts. The construction and maintenance of roadways is often followed by the placement of the erosion control products (ECPs [e.g., erosion control blankets, spray-on mulch]) on the landscape. The Texas Department of Transportation's (TXDOT) approved products list (APL) contains 146 different ECPs that a contractor can install on a construction site. Only two criteria must be met for an ECP to be listed on the APL: 1) the ECP must promote vegetation growth, and 2) the product must adequately prevent soil loss. There are no criterion that consider the impacts ECPs on wildlife. Recent studies have found that snakes are vulnerable to entanglement in ECPs with certain traits (e.g., plastic netting with fused corners). We conducted a meta-analysis to quantify the diversity of traits of the 146 ECPs (i.e. material type, aperture size, mesh type). In addition to identifying the ECPs that would put snakes at a high risk to entanglement, we also identified those ECPs that would likely be the most snake-friendly based on their traits (e.g., woven mesh with a large aperture size). These results can be used to inform and mitigate against the entanglement of snakes and other wildlife in ECPs and limit an additional source of mortality.

015.107 U Relationship Between *Juniperus ashei* Seedling Mortality and Large Mammal Herbivory, *Jeremy S Adkins, University of Texas at San Antonio; Oscar W Van Auken, University of Texas at San Antonio*

Juniperus ashei is the primary woody plant species in the Central Texas woodlands of the Edwards Plateau. The relationship between *J. ashei* seedlings and large mammal herbivory is unknown. Past studies have looked at the survival of *J. ashei* seedlings in relation to spatial cohorts, canopy position, temperature, precipitation, light levels, soil moisture, and soil nutrients. However, the purpose of this study was to determine the relationship between large mammal herbivory and *J. ashei* seedling mortality. The study site was at the Albert and Bessie Kronkosky State Natural Area in Central Texas (98°50'29.51"W, 29°44'35.525"N). The treatments compared the exclosure of 50 *J. ashei* seedlings and 50 non-exclosed *J. ashei* seedlings. *Juniperus ashei* seedlings were selected arbitrarily from under the *J. ashei* canopy. The cylindrical exclosures were 30 cm tall and 15 cm wide. Exclosures were constructed using 19-Gauge galvanized hardware cloth, tie wire, and 20 – 25 cm long rebar that were approximately 1 cm in diameter. The seedling observations occurred biweekly. Seedlings with any green foliage present were considered alive. Between July 21, 2019, and November 19, 2019, 47 exclosed seedlings survived and 46 non-exclosed seedlings survived. The seedling mortality was expected to be higher during the summer. There appeared to be no difference in mortality between the exclosed and non-exclosed seedlings (X2=0.154, P > 0.05). Factors that may have influenced the study site were hunting to control the deer population and the presence of a deer feeder that released feed twice a day.

015.108 U Search image development of prey odor in naïve checkered garter snake, *Thamnophis marcianus*, *Hetal N. Patel, University of Texas at Tyler; Neil Ford, UT Tyler Biology*

Snakes are born with innate preferences for specific prey and detect odors using the vomeronasal organ. As they grow their prey changes and neurological shifts in prey preference is likely to occur. This experiment tested whether changes in prey preferences can occur over a short duration. 25 naïve checkered garter snakes, *Thamnophis marcianus*, from 4 different litters were tested for initial preference on 4 odors (earthworms, tadpoles, fish and baby mice) and a control (tap water). The odors were prepared by soaking approximately 2g of the specimen in 100mL of warm water for 30 minutes. The snakes were double-blind tested in their individual home cages, covered with blank paper such that the experimenters could view the snakes without the snakes seeing the experimenters. The experimenter did not know which

odor was being tested and the snakes were randomly selected. The odors were presented on a cotton swab placed in front of the snake's nose. The number of tongue flicks over 3 minutes was counted. Animals were then randomly placed on a diet of either fish or baby mice for 5 weeks. Snakes were re-tested with the same 5 odors. After, being fed on a specific diet, we observed an increase in the mean tongue flicks to the odor of the current diet fed but a decrease in mean tongue flicks to the earthworm and tadpole. This suggests that prey odor search image can change rapidly when prey abundance or availability changes.

015.109 U Selection of Egg Nesting Habitat in Twin-spot Rat Snakes, *Elaphe bimaculate*, *Nathaniel James Bilby, UT Tyler Biology; Neil Ford, UT Tyler Biology*

Recent studies suggest that one species of Australian egg laying snake selects nest sites with moisture levels that produce offspring that have the highest survival. Whether this ability is found in other species of snake is unknown. In this experiment we provided 3 moisture levels in nesting soil concentrations choose from for 8 gravid *Elaphe bimaculate* to lay eggs. In previous work we determined that a 1 to 1 concentration of medium vermiculite and water produced the highest level of hatching. We used concentrations from 50%, 100% and 200% water to vermiculite mixture, to simulate dry, normal and wet laying environments. The concentration the gravid females laid eggs in was recorded and a chi-squared test was used to determine the significance of the results. The $\chi 2$ value for the data collected was 1.00 with 2 degrees of freedom, indicating that the females had no preference with respect to moisture levels. Eggs were then sorted into the 3 concentrations for incubation. Any mortality and the length and mass of each offspring at hatching will be measured to determine if the moisture level selected was correlated to the healthiest offspring.

015.110 N Tardigrades of Texas: Austin Fifth Graders add another two species to the Texas Biodiversity list, *Hannah Cotten, Hill Elementary, Austin ISD; William R. Miller, Baker University*

There are 37 species of tardigrades documented in literature as defining the biodiversity of the phylum Tardigrada in the state of Texas. Since Texas is a large state with a wide variety of habitats and yet tardigrades are rather understudied, Hill Elementary fifth graders carried out a survey of tardigrades living in lichens and mosses on campus. Surprisingly, within their samples from their first year of study, there were three tardigrade species new to Texas. Then, a benefactor donated a large (20 cm) fresh water sponge that had been growing in his front yard pond in Austin, Texas. It was covered with an obvious layer of algae. With simple sampling rules and the previously developed

protocols, they quickly found several specimens that looked new and different. They made and sent slides of the specimens to an expert and discovered that two species were in fact new to the state of Texas. These discoveries could not have been made without the collaboration of an expert and teacher, coupled with the diligent field research conducted by these students. When scientists, educators, and students work together, further exploration and discovery can occur which enhances our understanding and abilities to be well-informed, good stewards of our world.

015.111   G   The bees of a sandhill community before and after a rare flooding event in the Big Thicket National Preserve, Texas, *Archie R Sauls, Stephen F. Austin State University; John Pascarella, Sam Houston State University; Daniel Bennett, Stephen F. Austin State University*
In early 2017 a bee survey was initiated in a xeric sandy upland habitat in the Big Thicket National Preserve, Hardin County, Texas. This survey continued until late August when it was interrupted due to flooding caused by Hurricane Harvey. The survey was conducted again in 2019 in order to examine the effects of flooding on bee species diversity. Due to standing flood waters, we hypothesized that bee species nesting below ground were impacted more than above-ground nesting bee species. Data are presented that examine this hypothesis.

015.112   U   Three-year assessment of small mammals in an urban ecosystem, *Madison Alexander, East Texas Baptist University; Ariana Lopez, East Texas Baptist University; Troy A Ladine, East Texas Baptist University*
We assessed small mammal abundance in a urban ecosystem in Marshall, TX (32°33'N; 94°22'W) each for 3 months each fall beginning 2017 through 2019. Tracking tubes were placed in a 6 X 5 grid on the Environmental Studies Area of East Texas Baptist University. Tubes were in a wooded area adjacent to the ETBU soccer field and were baited with oatmeal through duration of data collection. Beginning 2018, camera traps were added to further assess small mammal abundance. An adjacent portion, 50 m from edge of tracking-tube grid, of the wooded area was cleared of understory vegetation by the University spring 2019. Fewer tracks were observed in 2019 (RAI - 1.5) compared with 2017(RAI - 3.8) indicating the importance of understory vegetation for small mammals. Activity shifted away from the cleared area. The two closest lines of tracking tubes exhibited a decrease in activity between the two years (2017- 13; 2019 - 3). Vegetation data related to food habits for mice are being collected for further assessment of small mammal data.

015.113   U   Toxicity Effects of Formic Acid on Lone Star Ticks, *Bailee Dorsey, Schreiner University; Ryan Caesar, Schriener University; Allan Showler, USDA-ARS KBUSLIRL*
Babesia is spread by Boophilus microplus and is commonly known as Texas cattle fever. Despite being locally eradicated in 1943, cattle fever has been reemerging throughout South Texas over the past couple decades. Environmentally safe methods to control the spread of tick populations are currently under investigation. Formic acid is naturally produced by predatory ant species and was used to examine its effects of repellency and toxicity on Amblyomma americanum. It was proven that formic acid failed to repel ticks but was fatal when applied in a fumigation setting or by contact. Overall, larvae killed at a quicker and higher mortality rate than the nymphs.

017. Poster Presentation and Judging: Chemistry/Biochemistry, General Science, Marine, Mathematics/Computer Science, Physics/Engineering, Plant Biology, STEM, Systematics/Evolutionary Biology
6:30 to 8:00 pm
Cole STEM Building, Hallways
Texas Academy of Science Annual Meeting
    Poster Presentation and Judging: Chemistry/Biochemistry, General Science, Marine, Mathematics/Computer Science, Physics/Engineering, Plant Biology, STEM, Systematics/Evolutionary Biology
Participants:

017.114   G   A Faradaic Nanoscale Water Pump with No Moving Parts, *Shane Richard Wilson, University of Texas at Arlington; Purnendu Sandy Dasgupta, UTA*
In microscale systems, traditional mechanical pumps often represent the largest and most power consuming component, compromising the esthetics of system architecture. We describe here a pump with no moving parts that in principle can pump high purity water. The pump utilizes bipolar ion exchange membranes (BPMs). A BPM is a single membrane whose one face has been functionalized to be a cation exchange membrane (CEM) and the obverse face has been functionalized to be an anion exchange membrane (AEM). The enhanced ionization of water in an electric field at the internal interface of a BPM is exploited to make what is effectively a Faradaic ion pump. The $H+$ and $OH-$ formed within the internal interface of two individual BPMs are respectively drawn forth by an electric field into a confined space between the two membranes and the reformed water exits this enclosure as the pumped fluid. The pump is thus basically a sandwich of two bipolar membranes with feed water reservoirs on the exterior sides whereas the central compartment between the membranes serves as the production / water reformation chamber with a single

exit. The BPMs are so oriented such that the AEM face of both BPMs face the anode, and the CEM face of both BPMs face the cathode. Predictably, the generated flow rate is linearly correlated with the applied current. Sufficient flow rate can be generated for use in open tubular chromatography. Purity of the water generated and pressure tolerance of the device are under study.

017.115   U   Assembly of Coiled-Coil Peptides via Click Chemistry and Studies Regarding their Self-Assembly, *Grace Bertles, The Univ. of Texas at Tyler; Samuel Fraley, The University of Texas at Tyler; Dustin Patterson, University of Texas at Tyler; Sean Butler, The University of Texas at Tyler*
One of the major challenges in the construction of nanomaterials is the difficulty of synthesizing materials with well defined, homogeneous structures. However, nature shows the innate ability of yielding homogeneous structures that are arranged at the molecular level through construction of diverse bio-nanomaterials through the non-covalent self-assembly of proteins. Inspired by the bio-specificity and driven self-assembly of proteins/peptides, the research presented investigates the use of peptides to construct molecular building blocks (MBBs) that provide step-by-step control of the bottom up self-assembly of nanostructures. The strategy looks at constructing MBBs by exploiting coiled coil forming peptide sequences with two connected faces that are bio-specific and only associate with their designed partners allowing association and assembly when complementary building blocks are added. The results presented here are for the synthetic peptide synthesis of the coiled coil peptides containing non-natural amino acids that allow cross-linking between peptides to produce MBBs and preliminary results of their construction and self-assembly via click chemistry.

017.116   U   Banana Peel Extract: A Potential Ligand for Unusual DNA Motifs, *Matthew Beasley, Department of Chemistry and Biochemistry, Stephen F Austin State University; Benjamin Mason, Department of Chemistry and Biochemistry, Stephen F Austin State University; Bidisha Sengupta, Stephen F. Austin Statue University Department of Chemistry and Biochemistry*
Quadruplex (G4/C4) forming sequences in telomeric DNA and promoter regions of oncogenes are associated with tumorogenesis. Stabilizing these unusual tetraplex structures in DNA can prevent tumor cell proliferation, which have been regarded as potential pathways for cancer therapy. In our previous studies we have proved plant flavonols as useful G4/C4 binders. In the present study, we have prepared an isopropanol extract from banana peel (BE) and performed a comparative study on the binding of BE and a flavonol morin with G4/C4 using steady state absorption, fluorescence, circular dichroism and size exclusion chromatography (SEC)

measurements. FTIR spectroscopy provided the presence of –OH and –C=O in BE. Two complementary G4 and C4 single stranded oligonucleotide along with the duplex (made by hybridizing the G4/C4) were used. We noticed that in C18 HPLC the retention time of BE and morin are the same, indicating similar sizes of the two. BE shows significant solvent dipolar relaxation when studied in solvents of different polarity. BE also exhibits excited state intra-molecular proton transfer (ESPT) similar to common flavonol-like fisetin. The comparative study reveals that BE has more affinity towards C4 DNA motif than G4 and duplex. This study demonstrate a powerful approach for examining the potentialities of the DNA binding ligands through exploiting the highly sensitive intrinsic fluorescence properties of the botanicals as their own "reporter" for their interactions with macromolecular targets.

017.117   U   Biotransformation of Benzofuran Derivatives by Carrot Strips and their Antimicrobial Properties, *Hailey Frances Jarzynka, Stephen F. Austin State University; Holly Jarzynka, Stephen F. Austin State University; Hannah Trauger, Stephen F. Autsin State University*
Carrot strips have been shown to biocatalyze the conversion of benzofuran derivatives to their corresponding alcohols using water as the solvent. Three benzofuran derivatives with slightly different structures have been studied. The conversion of benzofuran-2yl methyl ketone (BMK) to is chiral alcohol, S-bensofuran-2yl ethanol (BMA) with good yield and excellent enantiomeric excess has been well documented.(1) To study the effects of steric hindrance around the carbonyl group, 2-benzofurancabroxaldehyde (BCA) was selected since it only differs from BMK by a methyl group. To study the effect of solubility, 1-(7-hydroxy-1-benzsofurany-2-yl) ethanone (HBE) was selected. HBE has the same methyl ketone functional group; however, the addition hydroxyl group on the benzofuran moiety should increase the solubility in water compared to BMK. Carrots were able to catalyze the reaction of all three benzofuran derivatives. Reactions times were monitored via TLC and structures were verified using NMR. In addition, antimicrobial properties of the products have been studied using E. Coli (BL21) as a model prokaryote and Baker's Yeast as a model eukaryote. (1) Ravía, S, et al. Enantioselective Reduction by Crude Plant Parts: Reduction of Benzofuran-2-Yl Methyl Ketone with Carrot (Daucus Carota) Bits. J. Chem. Educ. 2006, 83 (7), 1049.

017.118   U   Cannabidiol Quantitation and Comparison to Advertised Concentrations Using Liquid Chromatography-Mass Spectrometry, *Cassandra Nicole Fuller, Schreiner University;*

Aleksandra Zapata, Schreiner University
As marijuana and hemp products become more popular, more cannabidiol products have become available over-the-counter. These products claim to ease many different ailments; including: pain, anxiety, epilepsy, schizophrenia, and glaucoma. Most of these products are not regulated or approved by the Food and Drug Administration. The lack of regulation of these products means that they may not be adequately tested, and therefore mislabeled. The goal of this research is to investigate different cannabidiol products sold in the Kerrville, Texas area and analyze the labeling accuracy. Specifically, CBD tinctures will be tested and compared to a CBD standard to determine the total CBD concentration of each product. An already-proven method for high performance liquid chromatography will be used, with the addition of mass spectrometry to improve the sensitivity. This will help determine which brands are accurate in their labeling, and which brands mislabel their products. This research could also be used further for the analysis and possible regulation of all types of CBD products.

017.119   U   Characterization of Flavonoid-Albumin Binding using Optical Spectroscopy and Molecular Dynamics Simulations, *Taylor Grays, Department of Chemistry and Biochemistry, Stephen F Austin State University; Humza Khurshid, Department of Chemistry and Biochemistry, Stephen F Austin State University; Bidisha Sengupta, Stephen F. Austin Statue University Department of Chemistry and Biochemistry*
The present study is initiated to explore the effectiveness of natural drug delivery mechanisms and investigates the interactions between drug and its natural carrier. Flavonoids are polyhydroxy phenolic compounds present in dietary plants of higher genera. Common fruits, vegetables, and drinks which contain flavonoids are berries, citrus fruits, apples, onions, broccoli, tea, coffee, and red wine. Flavonoids have protective characteristics and anti-oxidant effects against diseased cells, making them potent therapeutics. The binding between the flavanone hesperitin, flavonol morin and isoflavone daidzein is studied in the natural carrier protein serum albumin using optical spectroscopy and molecular dynamics simulations. The inherent fluorescence emission characteristics of the flavonoids along with that of tryptophan (Trp) residues of the protein were exploited to elucidate the binding location and other relevant parameters of the drug inside its delivery vehicle protein. Stern-Volmer studies at different temperatures indicate that static along with collisional quenching mechanisms are responsible for the quenching of protein fluorescence by the drug. Molecular dynamics and docking studies supported the hydrophobic interactions between ligand and protein, as was observed from spectroscopy.

017.120   U   Comparison of Synthetic Routes to Dye Molecules Bearing the Guanadinium Group, *Allison Conway, Midland College; Thomas Ready, Midland College*
The efficacy of two different synthetic routes to 8-(guanadinium) quinoline were compared. Route 1; formation of S-benzylisothiouronium chloride followed by reaction of the sulfur compound with 8-aminoquinoline. Route 2; direct reaction of urea with 8-aminoquinoline via imine formation. Both routes were successful in the synthesis of the target compound as confirmed by NMR. Optimization of both synthetic routes is still in progress and as such, yields of the final purified product are less that 40%. It is anticipated that both of these synthetic routes can be applied to a wide array of dye molecules bearing the guanidinium functional group.

017.121   U   Computational Analysis of Rhenium (I) Complex 1 as a Potential Commercial Alloy and Imaging agent, *Allison McKee, University of Houston-Downtown; Meheret Tadesse, University of Houston-Downtown*
Gaussian 16 and GaussView 6.0 software was used to build the molecular model and obtain theoretical data for [fac-Re(I)-(CO3)(L)], (L=tfd-dmpa (N,N-(4,4,4-trifluorobut-1-en-3-on)-dimethyl propylene diamine)). Rhenium complexes have been studied for their use as photosensitizers to be used to detect and treat cancer through photodynamic therapy (PDT) . Computational chemistry adds to the data gathered experimentally in this case, to add to the precision of the study of the rhenium compound. The computational chemistry software was used to compute and refine the Re(I) geometric structure and corresponding frequency. Gaussian 16 runs many mathematical expressions that operate different approaches to generate the data used to match the experimental and theoretical calculations. Each basis set is run to calculate optimization, which yields data concerning equilibrium geometry, and then frequency, which concerns other qualities such as harmonic frequencies and the highest occupied molecular orbital and lowest occupied molecular orbital (HOMO-LUMO) energy gap. Calculations run for electron core potential (ECP) are not as computationally intense relative to other basis sets as the electrons located in the inner orbitals are not as involved when bonding. The data produced by the Gaussian 16 software can then be tabulated for side-by-side comparison with pre-existing experimental data which can allow for greater determination of the physical and chemical properties of the molecule.

017.122   U   Copper(II) Complexes of 4,4′-Dimethoxy-2,2′-dipyridyl: Synthesis, Characterization and Cytotoxicity Studies, *Angel A Garza, University of the Incarnate Word; Rafael A*

Adrian, University of the Incarnate Word
New copper(II) complexes were synthesized by the reaction of copper(II) chloride, 4,4'-dimethoxy-2,2'-dipyridyl, and several antimetabolite ligands including isonicotinamide, 4-pyridinecarbonitrile, theophylline and imidazole. Complexes were characterized by infrared spectroscopy, elemental analysis and single crystal X-ray diffraction. In all new complexes the inner coordination sphere contains one bidentate 4,4'-dimethoxy-2,2'-dipyridyl and at least one antimetabolite molecule; other positions around the metal center are occupied by solvent molecules and/or anions. The cytotoxic activity of these new complexes against MCF-7 breast cancer cells will be reported and compare to that of other known metal complexes to establish their potential as antitumor drugs.

017.123 U **Denaturation Analysis of Beta-2-Microglobulin Y66H Mutant**, *Ricardo Garza, Austin College*
Denaturation Analysis of proteins and their mutants are performed in order to obtain valuable thermodynamic properties. Properties such as conformational stability and folding mechanism of the protein structure. The following study obtained the ΔG native state and value of equilibrium of Y66H; a mutant for Beta-2-Microglobulin. This was done through setting up assays and running them through a Fluorometer. After thorough graphical analysis the ΔG native state and value of equilibrium of Y66H were calculated. The findings show that Y66H is more stable than Wild Type B2M; thus it's propensity to unfold is more than B2M's.

017.124 U **De Novo Design and Engineering of Soluble Artificial Kinase Receptor Proteins**, *Manon Leyla Nassar, University of Texas at Tyler; Dustin Patterson, University of Texas at Tyler; May Abdelaziz, University of Texas at Tyler*
A major class of proteins associated with cancer are receptor tyrosine kinases (RTKs), which are involved in molecular signaling related to cell growth and proliferation. RTKs are composed of an integral membrane protein domain that is embedded in the membrane and a cytosolic (soluble) kinase domain. The cytosolic kinase domain becomes activated upon dimerization mediated by the integral membrane domain upon binding to biosignaling molecules (hormones). Drug therapies targeting the RTKs have largely focused on designing molecules that interact with the integral membrane domain, which binds to the signaling molecules, but have largely overlooked the kinase domain. Developing drugs to the kinase domain is difficult since the RTK protein is insoluble due to the presence of the integral membrane portion and removal of the protein from the membrane for studying drug binding can lead to denaturation and inactivation of the protein. The research presented here looks at developing artificial kinase receptors by replacing the integral membrane domain with soluble coiled coil forming peptides that can mimic the normal function of the integral membrane domain, i.e. dimerization, but produce a soluble artificial kinase receptor fusion protein mimic that can be used in drug screening assays to discover new RTK kinase domain inhibitors.

017.125 U **Determination of Tannin Content in Gluten Free Grains**, *Kayla M Stewart, Schreiner University; Adrian L Zapata, Schreiner University*
Tannin content is known to have an effect on the taste, clarity, and "mouthfeel" of beer. If necessary, the amount of tannin in wort can be adjusted prior to fermentation to improve the outcome. For traditional brewing grains, much is known about the initial and acceptable ranges of tannin concentration, but gluten free grains are not as well studied. Having an idea of the range of tannin content typically found in gluten free wort could assist brewers in adjusting brewing protocols to achieve the ideal phenolic content for a quality end product. To this end, a method was optimized for the determination of tannin content both in standard and gluten free grains. Using the Folin-Ciocalteu method and UV-Vis spectroscopy, the tannin content of these grains was determined under the recommended, standard steeping conditions for each. It was then investigated how significantly tannin content changes with adjusted pH, steep temperature, or steep time. This method can be used for a rapid tannin content determination in both standard and gluten free brewing grains.

017.126 U **Drug Discovery to Target *Cryptosporidium parvum***, *Grace Xiong, University of Texas at Austin*
Due to the prevalence of waterborne diseases worldwide and the lack of drugs to treat Cryptosporidiosis, C. parvum is a relevant disease targeted for drug discovery. One viable target is lactate dehydrogenase (CpLDH), an essential cytosolic enzyme involved in the process of glycolysis to produce ATP. GOLD, a computer software used to dock the 3D model of CpLDH, was used to facilitate virtual screening is facilitated. The top scoring compounds will be tested with a physical replica of CpLDH, created through three rounds of PCR (primary, IPIPE, and squared), cloning into pNIC-Bsa4, transformation into E. Coli BL21 cells, induction with isopropyl β-D-1-thiogalactopyranoside (IPTG), and purification with nickel affinity chromatography with 6xHis tag. GOLD results indicate ZINC12428242 from the Zinc CB pH 7.0 large library and C21H28N2O5 from the LOPAC small library are most promising in terms of predicted drug activity from the GOLD scores. Preliminary cloning results indicate that the full length coding sequence sequence has been isolated. The next step

would be PCR2 and cloning CpLDH into pNIC-Bsa4 for protein expression. This work could potentially identify a novel inhibitor for CpLDH.

017.127   U   Elution Profiles of Eleven PAHs on a C-18 Chromatographic Column Using an HPLC-UV Method, *Madilynn G. Dewell, Stephen F. Austin State University; Kefa K Onchoke, Stephen F. Austin State University*

The data presented in this research shows the elution profiles of polycyclic aromatic hydrocarbons (PAHs) benzanthrone (BA), 2-nitrobenzanthrone (2-NBA), fluoranthene (FL), 3-nitrofluoranthene (3-NFL), pyrene (PY), 1-aminopyrene (1-APY), 1-nitropyrene (1-NPY), chrysene, 6-aminochrysene, 6-nitrochrysene, and triphenylene by using high performance liquid chromatography (HPLC). The separation was achieved using an isocratic mobile phase solvent system (acetonitrile: methanol (50%:50%, v/v)), and a flow rate of 0.75 mL/min. Two wavelengths (280 nm and 254 nm) were monitored with a diode array detector (DAD). After optimization with use of an isocratic solvent system bands eluted from the column in the order: 1-APY (4.57 mins), < 6-AC (4.62 mins) < 2-NBA (5.77 min) < 3-NFL (6.33 min) < BA (6.41min) < 1-NPY (6.45 min) > FL (6.47 mins) < PY (7.13 min) < TP (7.46 mins) < chrysene (7.62 mins). Predictive of the retention times are the dipole moments, which are notably correlated to the elution profiles.

017.128   U   Engineering the HK97 Virus-Like Particle as a Synthetic Cargo Vessel, *Jeffrey Michael King, University of Texas at Tyler; Dustin Patterson, University of Texas at Tyler*

Protein cage structures are ubiquitous in nature and present useful nanomaterials for applications ranging from drug delivery to the construction of nanoelectronics. Among protein cages, virus-like particles (VLPs), which are derived from the protein shell or capsid of viruses but lack pathogenic components, are particularly intriguing for constructing nanomaterials due to their stability, well studied molecular assembly and structures, which are often characterized to the molecular level. The research presented looks at developing the VLP derived from the HK97 bacteriophage for synthetic encapsulation of large quantities of small molecule cargoes on the VLP interior.

017.129   U   Exploration of Functional Groups in N-Derivatized Nitroindolines, *Philip Baily, University of Texas at El Paso; Patricio Del Castillo, University of Texas at El Paso; Aurelio Paez, University of Texas at El Paso; Matthew R. Weaver, University of Texas at El Paso; Roberto P. Iturralde, University of Texas at El Paso; Carl W. Dirk, University of Texas at El Paso; Chunqiang Li, University of Texas at El Paso; Katja Michael,*

University of Texas at El Paso
The photolytic properties of N-acyl-7-nitroindolines make them attractive for the development of photocleavable crosslinkers when reversibility of the crosslinking by light illumination is desired. However, the formation of the amide bond of N-acyl-7-nitroindolines can be quite challenging. If other carbonyl-containing functional groups of 7-nitroindoline were more readily accessible while retaining photoreactivity, the development of such crosslinkers would be facilitated. Here we demonstrate the efficient syntheses of ureas, carbamates, and thiocarbamates of 7-nitroindoline, and compare their photolysis kinetics with that of an amide of 7-nitroindoline. We also show that these 7-nitroindoline derivatives can undergo one photon or two photon photolysis at 350 nm or 710 nm, respectively. Thiocarbamates of 7-nitroindoline undergo a clean photochemical conversion to a product believed to be a dimer of 7-nitrosoindoline, which is different from the known predominant photolysis products of amides of 7-nitroindoline. Our quantum chemistry calculations have elucidated the likely photochemical reaction pathway of thiocarbamates of 7-nitroindoline, which is in strong agreement with our experimental data. This study expands the scope of 7-nitroindoline-containing compounds and informs the development of novel photocleavable crosslinkers.

017.130   G   Expression of Cyp4f39 in *E. Coli* and Structural Analysis of its Active Site, *Madri M Jayakody, Sam Houston State University; Donovan C Haines, Sam Houston State University*

Human CYP4F22 is an epidermal ω-hydroxylase involved in the synthesis of acylceramide which is an essential lipid for skin barrier formation. Reduced enzymatic activity of CYP4F22 caused by mutations is correlated to autosomal recessive congenital ichthyosis (ARCI), which is a rare group of keratinization disorders characterized by abnormal scaling of the skin. We have started to study *cyp4f39*, the mouse ortholog of the human *CYP4f22* gene. Starting with in silico modelling, an *E. coli* expression system that can produce high level expression of protein is being developed to support further characterization of this important enzyme.

017.131   U   Imidazole: Nature's Special Ligand, *Neeleigh J. Smith, Stephen F. Austin State University; John Brannon Gary, Stephen F. Austin State University*

Imidazole is an important ligand for the function of many enzyme classes in biological systems. Imidazole is the nitrogen heterocyclic amino acid found to stabilize many metals in enzyme active sites. Given this evolutionary selection for imidazole in this role, unique ligation properties and tuneability must be

present in this system. In comparison to other common nitrogen heterocycles, the imidazole nitrogen present for Lewis basic interactions is remarkably basic when comparing the pKa's present in these systems. Given the ubiquitous nature of imidazole binding to metals in biology, it is striking the rarity of imidazole ligation present in bioinorganic model systems. This rarity is likely due to the more laborious synthetic and purification schemes required. Instead, other heterocycles such as pyridine and pyrazole are employed, although the fidelity of these models can be questioned. In contrast to the synthetic challenges of imidazole synthesis, computational chemistry allows for systematic investigation of these systems. This poster will demonstrate computational analysis of the binding of common nitrogen heterocycles to illustrate the unique role of imidazole ligation.

017.132 U **Influence of Composted Wastewater Sludge (CWS) on Zinc Uptake by broccoli (*Brassica oleracea* var.)**, *Brett P Horalan Jr, Stephen F. Austin State University; Kefa K Onchoke, Stephen F. Austin State University*
The potential risk of increased metal concentrations through the application of wastewater sludge (also known as biosolid) is of concern. In this experiment, answers to two questions were sought, namely, does (i) sludge increase the Zn amounts in plants when grown in soil-sludge mixtures? (ii) sludge deprive Zn from plants grown in soil amended with sludge? The present study was therefore conducted to investigate the influence of biosolid upon the uptake of Zn by broccoli (Brassica oleracea var.) grown in biosolid-amended soil compositions. To evaluate the influence of biosolids on Zn uptake, broccoli (Brassica oleracea var.), a commonly consumed vegetable, was grown in soil amended with biosolids at four different compositions (0, 25, 50, 75, 100% w/w) treated with 100 ppm Zn at the beginning. Plant tissues from pot experiments were harvested after 30 days and Zn concentrations analyzed in plant parts by using flame atomic absorption spectroscopy. While best growth was apparent at 25% (w/w) -75%, the Zn concentrations in plant parts were in the order [Roots] > [shoot] > [leaf].

017.133 U **Inter- and Intramolecular Interception of a Photochemically Generated Terminal Uranium Nitride**, *Gustavo Miguel Alcantara, University of Texas at El Paso*
Considering the elusiveness and rarity of f-element nitrides, their reactivity has not been explored to a significant extent. In our laboratory, we have been investigating the chemistry of the uranium azide complex $LArU(N_3)(NImDipp)$ (1) (Lar = Bis(Dipp)terphenylanilide; Dipp = 2,6-diisopropylphenyl). Photolysis of benzene solutions of 1 generates the amide (N-LAr)U(NImDipp) (2),

showing a propensity for C-H activation chemistry with the diisopropylaniline groups of the ligand, implicating the passing formation of (LAr)U(N)(NImDipp) possessing a terminal uranium nitride bond. In an effort to target terminal uranium nitrides while circumventing intramolecular chemistry with the ligand, we have been synthesizing the less sterically encumbered ligand $Bis(tBu)terphenylanilide (LtBu)_2$-. With this ligand in hand, we are working towards the synthesis of the U(IV) azide $(LtBu)U(N_3)(NImDipp)$ and investigation of its photochemistry.

017.134 G **Investigation into Murine ω-Hydroxylase Cyp4f13, a Tumor Cell Potentiator, using Homology Modeling and Molecular Dynamics Simulations**, *Jerome Wade Butler, Sam Houston State University; Donovan Haines, Sam Houston State University*
The cytochrome P450 (CYP) 4F subfamily of enzymes have been investigated for their role in eicosanoid metabolism. ω-Hydroxylases are physiologically important biomolecules, belonging to the conserved super family of heme-thiolate monooxygenases known as cytochrome P450 enzymes; they are a major participant in drug metabolism. Their main mode of action is the biotransformation of eicosanoids, derived from 20-carbon polyunsaturated fatty acids, to more polar metabolites. Human CYP4F enzymes have been observed to be key factors in blood pressure regulation, kidney function, inflammatory response and tumor cell metastasis. Murine Cyp4f13, a previously reported homolog of human ω-hydroxylase CYP4F3, has been identified; however, its native substrate and active role in the murine system is yet to be fully understood. A molecular dynamic model has been produced by structural alignment of established crystal structures of two more studied cytochromes, CYP102A1 and CYP3A4, embedded in a membrane bilayer to which the enzymes are found anchored to *in vivo*. A thermodynamic ensemble has been developed to replicate the physiological environment of the protein system. Through Visual Molecular Dynamics (VMD) and Nanoscale Molecular Dynamics (NAMD) software packages in combination with CHARMM force field, a dynamic model has been created. This model could be used to probe and identify key residues within the enzymes' active site using known P450 substrates and inhibitors. This could prove useful in understanding how these group of enzymes, which are potential therapeutic targets for tumor suppression and renal regulation, interact with their expected membrane-localized lipid substrates.

017.135 U **Investigation on CO Release of Bipyridine Flavonolate Platinum (II) Complexes**, *Ivan Jimenez, Stephen F. Austin State University*
Carbon Monoxide (CO) has been suggested as an

approach for treating cancer. Carbon monoxide-releasing molecules (CORMs) that enable the delivery of controlled amounts of CO have gained strong interest among biochemists. Herein, a series of bipyridyl (Bpy) Pt(II) complexes with 3-hydroxyflavone (Fla) [PtBpyFlaR][BF4] (R=OCH3 (1), R=CH3 (2), R=H (3)) were prepared and characterized. The molecular structures of the three compounds were determined by UV–Vis, 1H NMR,13C NMR, FTIR, ESI mass spectra and elemental analysis. Their ability to release carbon monoxide was investigated through oxygenation reaction under various conditions of temperature and light irradiation.

017.136   U   Investigation on Oxygenation & Nitroxygenation of Half-Sandwich RuII-Arene-Flavonolate Complexes, *Jacob Matthew Cotten, Stephen F. Austin State University; Xiaozhen Han, Stephen F. Austin State University*
Flavonoids are a well known group of antioxidants that have become very popular as a promising new ligand in inorganic anti-cancer complexes. These metal-flavonoid complexes show a proclivity towards cytotoxic properties via DNA binding as well as a high degree of cyto-selectivity towards cancer cells. By reacting with nitroxyl (HNO) and other forms of singlet oxygen, flavonoids and metal-flavonoid complexes undergo a reaction that releases CO as a byproduct. Investigations into the reactivity of a series of half-sandwich RuII-arene-flavonolate complexes with both molecular oxygen and HNO were done using UV-visible spectroscopy. From these investigative reactions it can be concluded that RuII-flavonolate complexes do react with molecular oxygen and HNO. Our research provides an insight into future studies regarding the CO release activity of the complexes as well as an implication for half-sandwich RuII-arene-flavonolate complexes to exhibit anti-cancer properties.

017.137   U   Key Design Principles to Achieve Ligand Redox Non-Innocence, *Alexandra E. Henderson, Stephen F. Austin State University; John Brannon Gary, Stephen F. Austin State University*
Most chemical transformations are fundamentally two-electron processes. This concept is exemplified in everything from resonance structures, arrow pushing mechanisms discussed in organic chemistry, and even complex organometallic reactions such as oxidative addition or reductive elimination. The propensity for most noble metals, such as platinum, palladium, rhodium, and iridium, to perform two-electron redox processes makes them ideal choices in developing metal systems for catalysis. While these metals have ideal chemical properties for the development of interesting chemistry, these metals are highly expensive and low abundance in nature. In contrast biological enzymes utilize metals such as iron, manganese, and

copper because they have high natural abundance in nature. While highly abundant, these metals typically perform one-electron chemistry which makes them difficult to control. Nature has utilized a strategy to pair one-electron redox sites to perform similar two-electron chemistry. While this strategy is incredibly powerful, it has rarely been employed in synthetic model systems. This poster will describe computational chemistry analysis of some systems which are capable of pairing multiple redox sites to illustrate the possible key design features present in these systems to facilitate the development of more reactive systems in the future.

017.138   U   Lanthanide Coordination Polymers with 2-Aminoterephthalate and 2-Bromoterephthalate Linkers, *Conrado Jimenez, Angelo State University; Levi Glover, Angelo State University; Ralph Zehnder, Angelo State University*
Combining neodymium (Nd) with the terephthalate (TP) ligand and glutarate (Glut) entities using slow diffusion methods at room temperature yields an Nd-coordination polymer of formula Nd2(Glut)2(TP)(H2O)4•17H2O with spacious interstitial channels. As we have demonstrated before, this coordination network can easily integrate the 2-aminoterephthalate derivative (TPNH2) through replacement of some of the TP units, without altering the structural properties of this compound whatsoever (Nd2(Glut)2(TP)x(TPNH2)y(H2O)4•17H2O, with y= 1-x). The pure Nd2(Glut)2(TPNH2)(H2O)4•17H2O analogue can be synthesized through replacement of all TP with TPNH2. Herein we showcase the creation of a new lanthanide coordination polymer, in which 2-bromo-terephthalate (TPBr) and 2-amino-terephthalate (TPNH2) were both incorporated into the network, resulting in the mixed ligand compound; Nd2(TPBr)0.8(TPNH2)2.2(DMSO)3•3H2O.

017.139   U   Mechanoisomerization of Surface-Immobilized Azobenzene, *Victoria-Thy Lan Doan, University of the Incarnate Word; Madeleine Blumenthal, Texas State University; Heather Hanson, Texas State University; Shiva Rastogi, Texas State University; William Brittain, Texas State University*
We report the mechanoisomerization of azobenzene surface-immobilized on a polydimethylsiloxane (PDMS) elastomer. It is our hypothesis that mechanical deformation can induce geometric isomerization without bond cleavage. Mechanochemistry is direct manipulation of molecules using only physical forces. For example, when testing mechanical stress on polymeric materials, spiropyran molecules are used to indicate stress signals by responding to the mechanical force with a color change. Mechanoisomerization does not involve bond cleavage but only geometrical isomerization. The mechanoisomerization of azobenzene was demonstrated in polymer solutions

using sonication. Our study involves the direct application of stretching force on a PDMS elastomer with surface enriched azobenzene that is covalently bound to siloxane surface. We synthesized bifunctional azobenzenes with pendant double or triple bonds and isolated the metastable cis isomer with in situ UV-Vis cis generation. PDMS was prepared with excess Si-H groups which were used for a reductive silylation of the azobenzene derivatives. PDMS characterization before and after silylation was evaluated using attenuated total reflectance FT-IR spectroscopy. UV-Vis spectroscopy was used to monitor the mechanoisomerization by observing a shift in the lambda max of the n-pi* transition. We observed mechano-isomerization of surface-immobilized azobenzene. The rate of cis-to-trans mechano-isomerization was about 20x greater than the rate of thermal isomerization.

017.140 U Produced Water Remediation using Clay and Nanocomposite Filters, *Milka O Montes, University of Texas Permian Basin; Aidely Aranda, University of Texas Permian Basin*
Hydraulic fracturing in the Permian Basin produces approximately 80,000 cubic meters of flowback and produced water per well, which represents a major strain on the water supply. The present work shows the application of sustainable metal-carbon nanocomposites and clay filters for the removal of different contaminants from waste and produced water. The high-surface-area nanocomposites were prepared by the carbonization of a mixture of copper, magnesium and zinc salts and reducing agents. The metal-carbon nanocomposites comprised of metal oxide nanoparticles (about 35 nm) and high surface area graphene-like carbon and the clay filters, were characterized by transmission electron microscopy (TEM) and scanning electron microscopy (SEM). The nanocomposites were further characterized by the X-Ray powder diffraction, energy-dispersive X-ray spectroscopy, and FTIR spectroscopy. Adsorption capacities and removal of contaminants from produced water results will be presented.

017.141 U Silver Nanoclusters on the DNA Scaffold as Probe to Study Protein Folding, *Abigail Jones, Stephen F. Austin Statue University Department of Chemistry and Biochemistry; Bidisha Sengupta, Stephen F. Austin Statue University Department of Chemistry and Biochemistry*
Fluorescent silver nanoclusters (Ag-NCs) are being used as novel sensing materials due to their robust emission, biocompatibility, and photostability. Previous studies on cytosine rich oligonucleotides with repeated bases such as C3AC3AC3AC3A as scaffolds for growing NCs enabled the formation of near-infrared (NIR) fluorescing Ag-NCs. To understand how the bases and base sequence influence the cluster formation, we initiated a study on an array (5 sequences) of sixteen bases long single stranded template 5'-C3XiC3XiiC3XiiiC3Xiv -3' where i, ii, iii, iv correspond to T/G/C deoxynucleobases (with default base A). We observed that a single base mutation can dramatically alter the fluorescence emission properties of the Ag-NCs. Among all the sequences, we isolated a sequence C3AC3AC3TC3G which grows three different near-infrared-emitting NC species with absorption/emission maxima at around 620/700 (species I), 730/800 (species II) and 830 (Species III) nm respectively. We exploited the NC emission to study the folding of a peptide. This study is likely to provide a more definitive approach to design and obtain a targeted DNA Ag-NC with required emission properties for imaging purposes.

017.142 U Singlet Oxygen Susceptibility of Candida albicans, *Arlene M Salazar, University of the Incarnate Word; Abraham N Ruiz, University of the Incarnate Word; Christopher G Pierce, University of the Incarnate Word; Robert N. Garner, University of the Incarnate Word*
Candida albicans is a common opportunistic fungal pathogen and is capable of causing disease ranging from superficial infections, such as oral candidiasis, to life-threatening systemic infections. In immunocompromised individuals, these infections are typically associated with unacceptably high morbidity and mortality rates, in part due to the limited arsenal of antifungal drugs. A main virulence factor of *C. albicans* is the ability to form biofilms on medical devices, such as catheters and dental implants, and biotic surfaces. Biofilms are of clinical importance, as these complex microbial communities are intrinsically resistant to commonly used antimicrobials and host immune defenses. Thus, targeting biofilms represents a viable strategy for the development of novel therapies against *C. albicans* infections, which are urgently needed. In this study, photodynamic antimicrobial therapy (PDAMT), an emerging alternative therapy, was used to treat in vitro biofilms. Briefly, a series of photoactive ruthenium(II) polypyridine complexes that can produce singlet oxygen when irradiated with visible light were synthesized, and their activity against preformed and forming *C. albicans* biofilms were tested. When irradiated with visible light, [Ru(bpy)2(dppn)]Cl2 was observed to have the greatest activity with an inhibitory concentration, IC50, of 0.25-0.5 and 16-32 micromolar against forming and preformed biofilms, respectively. No activity against biofilms was observed in the dark. PDAMT using photoactive ruthenium(II) polypyridine complexes has the potential to treat antifungal-resistant biofilm infections.

017.143 U Synthesis and Characterization of

Biodiesel Fuels Derived from Hickory Kernel Oil, *Russell J. Franks, Stephen F. Austin State University; Naidelyn A. Chicas, Stephen F. Austin State University* The nuts of the hickory tree (Carya spp.) are an intriguing source for biodiesel fuels due to their high fat content (approx. 60 % by weight). Nuts from shagbark hickory (Carya ovata) were shelled and triacylglycerols were extracted from the pulverized endosperm material, which yielded shagbark hickory kernel oil (SHKO). The SHKO was then subjected to transesterification using methanol under acid-catalyzed conditions, which produced shagbark hickory kernel oil methyl ester (SHKOME) mixtures. The resulting SHKOME mixtures were analyzed using 1H-NMR spectroscopy and gas chromatography. The 1H-NMR analysis showed that the SHKOME products were formed with excellent percent conversion (> 97 %). In addition, the SHKO was also subjected to transesterification with methanol under base-catalyzed conditions using potassium carbonate as a base. The base-catalyzed process also formed the SHKOME product mixtures with excellent conversion (> 90 % conversion, as determined by 1H-NMR analysis). Work in this area is ongoing to include other Carya species as well as investigation of the effects of ionic liquid on the reaction.

017.144   U   **Synthesis and Characterization of** *Cu/Ni-ZSM-5*, *Jenna-Rae A Flores, Undergraduate Student at the University of the Incarnate Word; Zachary Gentle, Graduate Student at Tulane University; Daniel Shantz, Faculty Advisor at Tulane University* Fugitive methane emissions and flaring of methane as a result of natural gas extraction and processing are an environmental concern. The use of zeolites to catalyze the conversion of methane gas to liquid methanol at the source of production (fracking wellhead for example) is one strategy to ameliorate this problem. Zeolites are crystalline minerals that have multiple properties that help define the specific framework of its type. For this project, the zeolite created was ZSM-5, which was then exchanged with different d-block metals that can be potentially used to catalyze the direct oxidation of methane to methanol. The base zeolite was prepared, calcined, and ion exchanged with copper, followed varying concentrations of nickel. The various zeolites prepared were then compared using EDX, diffuse UV-vis, and temperature cycle UV-vis. Although it appeared that both metals were integrated into the zeolite. it did not appear that they were interacting with each other. This does not preclude catalytic activity, the next stage of testing will be the methane to methanol testing, along with SCR of NOx.

017.145   U   **The Determination of Alpha Acids in** *Humulus lupulus* **(hop) Oils**, *Teah Nicole Tirey, Schreiner University; Aleksandra Zapata, Schreiner University* Hops are one of the four main ingredients when brewing beer. A hop plant is a flower that can add bitterness and aroma depending on which stage of the brewing process it is added. A combination of hop strains are used to produce particular beer styles. The different strains of *Humulus lupulus* add a different taste and level of bitterness to the finished beer. Different beer styles have a unique set of hops used. Using H-NMR we can determine alpha acids in various strains of hops and conclude which alpha acids contribute flavors (i.e., bitterness and aroma) to diverse styles of beer.

017.146   U   **Virtual Screening for Novel Inhibitors of 6-Phosphogluconate Dehydrogenase (6PGDH) in** *Leishmania Major*, *Dzung Phuong Pham, University of Texas* The purpose of this research is to implement virtual screening to more efficiently identify novel inhibitors for 6-phosphogluconate dehydrogenase (6PGDH) in Leishmania major to better treat leishmaniasis disease. 6PGDH is a crucial cytosolic enzyme in the pentose phosphate pathway (PPP) that synthesizes NADPH and ribulose 5-phosphate, which acts as a precursor to sugar for DNA and RNA biosynthesis. Since 6PGDH has an essential role L.major, this enzyme serves as a promising target when discovering novel small molecule inhibitors. Unlike drug discovery via High Throughput Screening (HTS), where compounds are individually tested for their effect against enzymatic activities, virtual screening is more cost and time effective due its capability to screen hundreds of thousands of compounds in a few days. We implement 3D molecular ligand-docking programs, such as GOLD (Genetic Optimisation for Ligand Docking), to virtually analyze the bonding interactions between enzyme and ligand in order to predict the most favorable binding affinity. In order to search for novel inhibitors, more than 124,000 compounds from the ZINC library were screened, and the top ten highest scoring compounds, filtered using Lipinski's Rule of Five, were selected for use in a binding assay. Expression of the 6PGDH enzyme was performed for testing in binding assays with candidate compounds from virtual screening. If the results from the binding assay demonstrate strong inhibition, the findings will contribute to the knowledge of to improve treatments against the leishmaniasis disease.

017.147   U   **Examination of the Encapsulation of Protein Cargoes Inside the HK97 Virus-Like Particle**, *Suefian Aiman Kandeel, University of Texas at Tyler; Dustin Patterson, University of Texas at Tyler; Bubacarr Ceesay, University of Texas at Tyler* Enzymes are protein catalysts that have many useful

functions in industrial and technological applications, however the stability of enzymes is often a major barrier for greater utilization in many advanced applications. One approach toward enhancing the stability of enzymes is to encapsulate them in a biological protein cage derived from viruses, called a virus-like particles (VLP), which can provide a protective structure around the enzymes that is predicted to enhance overall stability and provide a molecular scaffold that can be chemically modified without direct modification of the enzymes entrapped inside. For our studies, we investigate the encapsulation of enzymes inside the Hong Kong 97 (HK-97) bacteriophage derived VLP, which forms a unique molecular chain mail catenane protein cage structure in its mature head form. The research presented focuses on encapsulation of GFP to determine optimal methods for enzyme encapsulation inside the HK-97 VLP and the investigation of encapsulation of the CelB enzyme. The enzyme CelB is a beta-galactosidase that is of interest for biofuels and synthesis of pharmaceuticals due to properties that make it a useful "model" enzyme for initial studies, such as its robust nature against high temperatures and chemical denaturation.

017.148   U   Disease Prevalence in Association with *Spirobranchus giganteus* in Boulder Coral in Roatán, Honduras, *Terri Cox, Texas Tech University; Alaina Tarter, Texas Tech University*
Globally, coral reef ecosystems are appearing with a prevalence of increased decimation. It is becoming imperative to monitor coral diseases and note possible factors that influence reef health. This research focused on the possible association between Yellow Band Disease (YBD) and White Plague (WP) in six species of Scleractinia corals in association with christmas tree worms, *Spriobranchus giganteus*. Depth was also a factor in this study. YBD and WP disease are known diseases common in hermatypic corals, but the exact vector and causative agent of these diseases is unknown. This research utilized a 2-meter by 15-meter belt transect survey method at selected depths at known research sites of the Mesoamerican Barrier Reef located in Roatán, Honduras. The Scleractinia coral species Orbicella annularis was found with high frequency of disease, and a low frequency of *S. giganteus*. The majority of the all coral species observed harboring *S. giganteus* were noted as healthy. This research concluded with 17% of the total coral observed being diseased, and of that, 2% harbored *S. giganteus*. No association was identified between coral disease and *S. giganteus* or between depth and disease. Factors such as possible vectors and disease ecology can affect coral reef ecosystems. Being that coral reefs are the most diverse ecosystems in the world, the challenge remains on the identification of possible vectors, education concerning conservation and current research to allow

for early disease intervention.

017.149   U   Effects of dusky damselfish algal farms on host coral health on the Mesoamerican Barrier Reef in Roatán, Honduras, *Maria Lozada, McLennan Community College*
Over the past 35 years, coral reefs have been on a rapid decline due to coral diseases. Past studies have found that algae may act as a reservoir for coral pathogens. Dusky damselfish are a territorial Caribbean fish species that remove coral polyps to farm algae. Prior studies suggested a higher prevalence of coral disease within dusky damselfish territories due to the presence of these algal farms. This study was conducted to assess the effects of dusky damselfish algal farms on host coral health on the Mesoamerican Barrier Reef in Roatán, Honduras. As algal farms harbor bacteria, disease prevalence was expected to be higher in host corals of dusky damselfish. Surveys were conducted twice at each of five dive sites from May 13-17, 2019 in Roatán, Honduras. At each damselfish territory, researchers identified algae species, host coral species, and host coral health. Also recorded were presence of fish bite lesions and algal encrustation. If disease was present, the disease was also identified. The depth and size of the host coral were also recorded at each territory. Of the 42 host corals assessed during this study, only 6 corals were diseased. There was not a statistically significant association between algae presence and coral disease. Future research should include a comparison study on reefs not experiencing a phase shift of algal dominance.

017.150   U   Potential Vectors for *Millepora*, in Encrusted Octocorals on the Mesoamerican Barrier Reef in Roatán, Honduras., *Shirley Stewart, McLennan Community College; Sarah Cole, Texas Tech University at Waco; Madilyn Danielle Hill, McLennan Community College; Alyssa Aquino, McLennan Community College; Katelynn Singh, Texas Tech University at Waco; Shannon Kathleen Hill, McLennan Community College; Stephanie Lockwood, Texas Tech University at Waco; Stephanie McMillan Randell, McLennan Community College*
Millepora spp. (fire coral) and octocorals; sea fans, sea rods, sea whips and sea plumes, make-up an abundant part of the Mesoamerican Barrier Reef. *Millepora* can parasitize octocorals and thus overtake portions of the reef. Some fish species and the bearded fireworm are suggested as potential vectors of *Millepora*. This study was undertaken to assess the frequency of fish species and bearded fireworms in *Millepora* encrusted octocorals on the Mesoamerican Barrier Reef in Roatán, Honduras and to investigate their roles as potential vectors of parasitizing *Millepora*. Randell-Robertson Marine Surveys were conducted twice at each of five dive sites from May 12-17, 2019. The

health status of each encrusted octocoral was recorded along with its height and distance to the nearest fire coral colony. Fish species and presence of bearded fireworms within fire coral colonies and encrusted octocorals was recorded. Dusky damselfish were the most frequently observed fish species. As bearded fireworms are primarily nocturnal, none were recorded in this study. Future studies should further investigate the potential relationship of dusky damselfish as vectors of *Millepora* and expand the study to include *Millepora* spp. and nearness of sponges, as filtration may have an impact on distribution of *Millepora*.

017.151   H   HiC-Pipeline: a Kepler and Spark-based Scalable Workflow for Normalized Contact Map Creation, *Sanjay Nagaraj, Baylor College of Medicine*
Hi-C and similar genome-wide assays map pairwise interactions between fragments of chromosomes that are close in three-dimensional space. Because of the nature of mapping pairwise interactions, the read depth of HiC datasets scales with the square of the genome size, and therefore a computational bottleneck of HiC analysis is the mapping of small fragment reads to generate normalized contact maps. Additionally, many methods of performing this step require frequent user input and expertise at each step of the process, which can often be confusing and laborious for the user and require an intensive training process. Here we provide an efficient and accurate workflow model, HiC-Pipeline, that is designed with scalability in mind to process large volumes of raw Hi-C data. HiC-Pipeline is implemented using Apache Spark, a distributed data processing framework, and the Kepler framework for parallel processing and ease of access. It additionally can be utilized in parallel with widely used visualization softwares such as Juicebox to produce high quality manuscript-ready maps. We find that HiC-Pipeline outperforms state-of-the-art workflows in terms of speed while maintaining comparable accuracy and is scalable with regards to both the size of a dataset and the number of compute nodes available.

017.152   U   Optimizing shift work schedules using mathematical models for circadian rhythms, *Courtney Allison Mendez, Schreiner University*
Over eleven million people in the United States are asked to work outside of the typical 9-5 workday. These irregular schedules have been associated with a wide array of physical and mental health disorders. These issues can be attributed in a large part to disruption of the bodies natural physiological rhythms. Daily cycles in human behavior and physiology are known as circadian rhythms and are driven by a small set of neurons in the hypothalamus. These neurons encode the bodies internal clock and must be reset on a daily basis by exposure to light. Shift work disrupts these rhythms by altering the natural light cycle. In this study we model the human circadian clock using a nonlinear dynamical system and develop light exposure schedules which can minimize the disruption of the circadian clock in shift workers.

017.153   U   Moving Object Detection Using Optical Flow Algorithm in Mobile Robot, *Omer Mir, Univeristy of Houston Downtown; Yuchou Chang, Univeristy of Houston Downtown*
Object detection, tracking, and recognition in computer vision are basic tasks. Object detection is the most important task, since object's bounding box is required to be given for other tasks. Mobile robot needs to detect objects and track and recognize them for advanced robot applications such as human-robot interaction. For detection of objects, human faces, people, and cars have been widely investigated, which are important targets in monitoring, transportation, and healthcare. Robot agents need to understand the scene more comprehensively, so that robot tasks including manipulation and navigation are more accurate. For this reason, accurate object detection is desired in mobile robot research. In this research, we study optical flow algorithm for object detection in mobile robot application. Optical flow is pixel movement of moving object on imaging plane. It uses the changes in the time domain of the pixels in the image sequence and the correlation between adjacent frames to find the existence between the previous frame and the current frame, and therefore calculate the motion information of objects between adjacent frames. Optical flow algorithms is studied for detecting object of mobile robot. Object can be accurately detected on Cozmo robot – a mobile robot for tracking and recognition tasks. Optical flow algorithm shows promising object detection on mobile robot.

017.154   U   Neural Networks and Linear Regression to Predict Median Home Value, *Elda Nazare Costa da Piedade, University of Houston-Downtown*
The objective of this research is to implement linear regression and neural network algorithms to predict the median home value for Houston zip codes. Data was gathered from 96 zip codes in Houston by utilizing python web scrapping resources to collect data from the Texas Hometown Locator website (owned by HTL, Inc.).With the dataset extracted and cleaned, exploratory data analysis and statistical analysis was performed to understand the relationship between median home value and other variables, such us diversity index, per capita income, and average household size. Based on the analysis, data was modeled with linear regression and neural network, with the goal of assessing which model yields best results. Initial results from the linear regression model

indicate that the diversity index and average household size are not significant predictors. On the other hand, the per capita income identifies as the best predictor. Additionally, although previous assumptions, the diversity index (a scale of 0 to 100 that represents the likelihood that two persons, chosen at random from the same area, belong to different race or ethnic groups) is only moderately negatively correlated with median home value. In other words, the more diverse a zip code is, the slightly smaller is the median home value. Further into this research, the population in focus will extend to other Texas cities, such as Austin. With more data the relationship between diversity index and median home value can be better evaluated.

017.155   U   Optical Flow Based Mobile Robot Navigation with Search Algorithm, *Arbaaz Polra, None; Yuchou Chang, Univeristy of Houston Downtown*
Optical Flow Based Mobile Robot Navigation with Search Algorithm Arbaaz Polra and Dr.Yuchou Chang Department of Computer Science and Engineering Technology, University of Houston-Downtown, Houston, Texas, United States 77002
Abstract: In the visual navigation and positioning system, the most widely used method is the navigation method of installing a vehicle-mounted camera in the robot for robotic vision. Control equipment and sensing devices are mounted on the robot, and high-level decisions such as image recognition and path planning are completed by intelligent controller. The visual navigation positioning system optically processes the environment information around the robot. As an important environment information, optical flow is able to acquire motion information of moving objects, and therefore guide robot navigation under dynamic environment. Optical flow algorithm is a very important subfield of computer vision. It is one important method for studying continuous moving images. It describes the apparent motion of moving objects in grayscale or color space mode. Optical flow can extract important information such as structure, depth, and contour in a moving scene without acquiring the position and characteristics of a moving object in advance. In this work, we investigate the combination of optical flow algorithm and A* search algorithm for mobile robot navigation. Moving object information extracted from optical flow is used for path searching environment. Potential obstacles are detected for dynamically updating navigation path of mobile robots. Incorporating optical flow shows promising improvement of robot navigation with A* search.

017.156   U   Parameter Estimation and Simulation of Bacteriophage Infection Model, *Abigail Rose Ballard, Tarleton State University*
Parameter Estimation and Simulation of Bacteriophage Infection Model Abigail Ballard(1)*, Dustin Edwards(1), and Keith Emmert(2) (1) Department of Biological Sciences, Tarleton State University, Stephenville, TX (2) Department of Mathematics, Tarleton State University, Stephenville, TX Bacteriophages are a class of viruses that infect and destroy bacteria. For this reason, they are an emerging focus in research due to their potential use in treating antibiotic resistant bacterial infections. Tarleton State University, as part of the international HHMI SEA-PHAGES bacteriophage discovery program, is working on an interdepartmental project between the biology and mathematics departments to create a mathematical model for the complexity of bacteriophage infection of host cells. A system of 4n+1 differential equations were derived to model these interactions. This system of equations was then used to simulate results for the infection outcomes of the different populations. These results were then evaluated in search of equilibria for populations in a given parameter space. It is our hope that these simulated equilibria can be used to identify infection outcomes for bacteriophages used in clinical settings to speed up testing before usage and effectively improve patient outcomes.

017.157   N   Spectroscopic Properties Of Radio Loud And Radio Quiet Quasars, *Anirban Bhattacharjee, Sul Ross State University*
Surveys have shown radio-loud (RL) quasars constitute 10%-15% of the total quasar population.Among quasars most have weak or no jets (radio-quiet) and some have powerful radio-emitting jets (radio-loud). This study shows the radio-loud fraction (RLF) increases with increasing full width half maximum (FWHM) of Hβ emission line. We have found that RLF for FWHM of Hβ emission line greater than 15000km/s (High Broad line or HBL quasars) is 0.577. In this poster presentation I will present the initial results of our investigation of these HBL quasars and their comparison with Low Broad Line or LBL quasars (FWHM less than 2500km/s). Our sample is based on quasars characterised in Shen et al. 2011 catalogue. We have used a magnitude cut (< 19.1) as above that the confidence level is very less and a redshift cut z < 0.75 to get the complete Hβ emission line profile. We have compared the various properties of RL and RQ quasars in this sample space.

017.158   U   A newly discovered pollinator of the grass pink orchid, *Calopogon tuberosus*, from the Watson Rare Native Plant Preserve, Texas, *Valerie Flores, Stephen F. Austin State University; Lacey Lee, Stephen F. Austin State University; Josephine Taylor, Stephen F. Austin State University; Daniel Bennett, Stephen F. Austin State University*
The grass pink orchid, *Calopogon tuburosus*, is well known to practice deceptive pollination by presenting a

false display of pseudopollen to its floral visitors, most of which are known to be bees in the families Apidae and Halictidae. While a bee is busy trying to extract pollen from an area where none exists, the orchid deposits actual pollen on the dorsum of the insect, where it is seemingly unable to be removed by the pollinator. Upon entry into another orchid flower, pollen is transferred and, apparently, no floral reward is obtained by the insect. Herein, we present information on a dense aggregation of grass pink orchids growing in a bog in the Watson Rare Native Plant Preserve in Tyler County, Texas. Furthermore, we provide the first record of the eastern carpenter bee, *Xylocopa virginica*, visiting flowers of this species and offer microscopic evidence that this bee is an important pollinator of *C. tuburosus* in eastern Texas.

017.159   U   **Modeling atoms and molecules using virtual reality**, *Juan Gabriel Barron, Student; Brian Barngrover, Stephen F. Austin State University*
The purpose of the project was a way to show high school and freshman level chemistry students the different ways that molecules interact with each other. There are other apps in the public that use virtual reality to show molecules and atoms using trackers, but they are not showing the whole picture to students. The app uses the positions of the atoms to determine if the pattern meets the condition for the molecule to appear. The paper seeks to answer the question: Can the app be able to show students a more accurate depiction of atoms forming bonds in the correct formation with the app. The app is expected to show students a better way of atoms forming molecules.

017.160   U   **Next Generation's Reaction to Weather Warnings During Severe Weather**, *Nina Symone Leyva, University of the Incarnate Word; Brianna Aimee Medina, University of the Incarnate Word*
Public interpretation of severe weather warnings is a serious concern for meteorologists. The public may be unaware of the meaning of the warnings because they subscribe to streaming services instead of watching or listening to television or radio. Young adults are more likely to receive alerts from a cell phone app, which does not explain precise information as does a trained, professional, and local meteorologist. This paper reports on research in the response of college students to weather warnings issued by the National Weather Service. College graduates represent an emerging socioeconomic segment of the next generation. South Texas is a study area location where hurricanes and flooding frequently occur, thus the reason behind the focus of this study. Two surveys were conducted. Each survey had five questions related to student knowledge of the difference between warnings and advisory statements. The results of the surveys within the student body of the University of the Incarnate Word were categorized by the student's demographic are pending.

017.161   U   **A 99 million year old lizard from Myanmar with Pan-Gekkotan affinities**, *Christina Harston, Sam Houston State University Natural History Collections; Juan D. Daza, Sam Houston State University Natural History Collections*
Mid-Cretaceous amber from Myanmar (Cenomanian ~ 99 million years old) has yielded the largest assemblage of microvertebrates in the world, including dinosaurs, birds, amphibians, and a large variety of reptiles such as lizards and snakes. Here we present a new specimen from these deposits. The piece of amber contains a small lizard with a large portion of the skull preserved including the bones premaxilla, maxilla, nasals, prefrontals, jugals, vomer, septomaxilla, palatines, pterygoids, dentary, coronoid, splenials, and compound bones. Postcranial elements include a complete left arm, right hand, and a portion of the tail. This fossil is identified as part of Squamata, and it has a combination of traits found only in the Pangekkota such as a frontal bone forming a nearly tubular structure for the olfactory bulbs, an orbit incomplete posteriorly, a coronoid bone exposed laterally in the jaw, pentadactyl hand with subequal toes. It also has an autapomorphy that distinguish this fossil from all other known Pan-Gekkota, a notched posterolateral process of the frontal. This fossil clearly represents a new species from this locality which will be described elsewhere.

017.162   U   **Codon Bias in Turtles**, *Alen Tarboush, University of the Incarnate Word; David Starkey, University of the Incarnate Word*
In the vertebrate Mitochondrial genetic code, all 20 amino acids are degenerate i.e., coded for by more than one codon. If usage of these codons was neutral, all would be used with, approximately, equal frequency. However, studies examining codon usage have noted bias in codon choice. A variety of hypotheses have attempted to explain this disparity. The most common explanations are mutational bias and increased translational efficiency. Studies examining codon usage, or codon bias, are often targeted at bacteria or mammals. However, in this study, we chose to look at a vertebrate group, turtles, that hasn't been previously examined. Turtles are an excellent choice for studies on codon bias given their diverse physiology and life history. Initially, codon bias was examined at the third position between the 2 major suborders of turtles: the Pleurodira and the Cryptodira. These analyses recovered multiple instances of bias between these groups. For example, the Cryptodira preferentially utilize TCA to code for serine (6-fold degenerate), whereas Pleurodira utilized TCC ($p<0.05$). If the suborders are analyzed separately, there is also bias evident. For example, the Chelidae preferentially utilize

codons with a 3rd position A (p<0.01) whereas the Podocnemidae preferentially utilize codons with a 3rd position C or T (p<0.01-0.05). A similar result was evident in the Cryptodira. Overall, these results suggest codon bias exists within different turtle suborders and families. Investigations are currently underway to determine if this bias can provide information regarding the evolution of turtles.

017.163   G   Cranial variation in the genus *Zygaspis*, *Antonio Meza, Sam Houston State University; Christopher J Bell, The University of Texas at Austin; Patrick J Lewis, Sam Houston State University*
Amphisbaenians are a family of worm-like reptiles consisting of over 150 extant species in 23 genera. Most modern studies of cranial anatomy of amphisbaenians are based upon high-resolution X-ray CT scans. CT scanning is nondestructive and allows for detailed examination of even small elements. Most of those studies remain focused on a single specimen and therefore do not account for variation beyond potential asymmetry in a single specimen. We focus on specimens from a single genus, *Zygaspis*, and examine several anterior cranial bones to better estimate morphological variation within a tightly circumscribed clade of Amphisbaenans. The cranial anatomy of *Z. quadrifrons* is well described, although the description is based on a single specimen. That baseline description now allows for both inter- and intraspecific variation to be estimated by expanding the previous work to include other specimens of *Z. quadrifrons* and other species in the genus. Here, we examined *Z. quadrifrons*, *Z. vandami*, *Z. niger*, *Z. ferox*, *Z. violacea*, *Z. dolichomenta*, and *Z. kafuensis*, whose collective distribution spans most of southern Africa. Two adults from each species were CT scanned and analyzed with Amira software. We examined over 15 characters, and found significant variation in several features, including the nasal-frontal suture, nasal foramen, and the frontal suture. Our preliminary results suggest that inter- and intraspecific variation does exist and should be accounted for in functional and phylogenetic studies. Further analysis of the genus, broadened to incorporate other cranial variables, would allow enhanced exploration of the morphological variation that occurs within *Zygaspis*.

017.164   U   Investigating origins of enigmatic populations of *Mentzelia* section *Trachyphytum* (Loasaceae) from western California, USA., *Brianna J. Garrett, Abilene Christian University; Sophia G. Wagle, Abilene Christian University; Mariana Castillo, Abilene Christian University; Joshua Michael Brokaw, Abilene Christian University*
Recent floristic surveys in the California Southern Coast Ranges have discovered populations of *Mentzelia* section *Trachyphytum* with morphological traits intermediate to *Mentzelia lindleyi* and *Mentzelia pectinata* that do not match descriptions of any taxa found in the latest treatment of *Mentzelia* section *Trachyphytum* in the *Flora of North America*. Previous molecular studies of section *Trachyphytum* have found abundant evidence of repeated homoploid hybridization and allopolyploid speciation. In this study we investigate patterns of chloroplast and nuclear variation in order to form hypotheses of origin for these enigmatic populations. Preliminary results suggest that these populations share greatest genetic similarity with *Mentzelia lindleyi* and *Mentzelia gracilenta*, the two species with geographic ranges closest to the unidentified populations.

017.165   U   Phylogeography of *Phreatodrobia conica* (Gastropoda: *Cochliopidae*), *Vanessa Michelle Torres, University of Texas-Rio Grande Valley; Kathryn Perez, University of Texas Rio Grande Valley; Dominique Alvear, University of Texas Rio Grande Valley; Pete Diaz, U.S. Fish and Wildlife Services*
In the Edwards-Trinity aquifer system of central Texas there are 8 species of minute, phreatic snails in *Phreatodrobia*, the cave snails. *Phreatodrobia conica* was described from cave and well samples in Comal and Bexar counties. We recently reported a population from spring orifice samples in Bell county, approximately 150 km disjunct from other known populations. To allow the placement of the species geographically, we are using COI sequences to compare *P. conica* from the disjunct population with the other known populations. The COI phylogeny supports a clade of *P. conica* distinct from the other members of the genus. We continue to sequence samples from all known populations and to incorporate 16S and LSU sequences to build a robust understanding of evolutionary relationships among *Phreatodrobia*.

017.166   U   Previously unrecognized phenotypic variation among populations in *Mentzelia* section *Trachyphytum* (Loasaceae) from the Southern Coast Ranges of California, USA, *Destiny Brokaw, Abilene Christian University; Kylie E. Davis, Abilene Christian University; Meghan E. Moten, Abilene Christian University; Joshua Michael Brokaw, Abilene Christian University*
Mentzelia section *Trachyphytum* is a polyploid complex of self-compatible annuals with a center of diversity in southern California. The Southern Coast Ranges in California contain several endemic and near-endemic species from section *Trachyphytum*, and narrow endemism is common in *Mentzelia*. Recent floristic surveys have produced several population vouchers with a suite of morphological traits that do not conform to recognized taxonomic boundaries in section *Trachyphytum*. In this study we compare morphological

variation among populations from the Southern Coast Ranges in order to generate hypotheses of relationships and species boundaries within section *Trachyphytum*. Although comparisons suggest that these newly vouchered populations are closely related to previously recognized taxa, their occurrence on sparsely vegetated vertic clay suggested that they may possess physiological as well as morphological traits distinguishing them from previously recognized species.

017.167   G   **Taxonomic identification of an East Texas Miocene Proboscidean ivory tusk fragment**, *Savanah Hamilton Davis, Sam Houston State University*
The goal of this project was to identify a proboscidean tusk fragment found in Rush Creek (near Woodville, Texas) down to genus. Since ivory microstructure is a diagnostic for many proboscideans, scanning electron microscopy (SEM) was used to study the microstructure of ivory. Microstructural features of the ivory examined included dentinal tubules, dentinal ridge presence, and overall texture (smooth/rough, distribution of tubules). Contradictory of most SEM samples, ivory does not require chemical preparation that can be detrimental to fossils. This project is relevant, for it could allow new conceptualizations of the paleoecological environment. If using this technique provides a new faunal distribution, the estimated knowledge of the paleoecological environmental information would need to be updated to include the genus and its possible impact. The method used in this study is courtesy of Lambert (2005) but has been updated with use of Varied Pressure-SEM (VP-SEM). It was found during imaging that utilizing VP-SEM mode in lieu of normal SEM mode produced higher resolution images. VP-SEM allows for biological samples that contain moisture to be imaged topographically in high resolution with a large depth of field. Comparatively, Lambert imaged using normal SEM mode and magnifications 300X, 1000X, and 1500X. In this study, images were obtained at these magnifications, and also 3000X. Overall, the genus of the sample was conclusively found to be Gomphotherium. After completing this identification, a continuation of SEM imaging ivory is planned in which several assorted samples of fossilized ivory are to be imaged and identified using VP- SEM.

017.168   U   **The highly specialized skull of the lamprophiid snake *Prosymna visseri***, *Elizabeth Marie Kull, Sam Houston State University*
Snakes, especially alethinophidians are well known for their highly kinetic skulls adapted for macrophagous diets. Their skulls have flexible upper and lower jaws. While their braincases are rigid, many of them retain mobility in the prokinetic, mesokinetic and metakinetic

planes. Here we present an unusual snake that departed extensively from this bauplan. *Prosymna visseri* (Lamprophiidae) has developed a skull that has lost the mesokinetic and metakinetic joints by developing synostosis between the nasals, and a single roofing element formed by the frontals, parietals, and the braincase, while retaining flexible jaws. The maxilla is transformed into a club-shaped bone with posterior teeth, and the dentary is edentulous. *P. visseri* exhibits a combination of rigid and flexible skull that might be linked to their dietary preferences. The cranial morphology of this snake is unlike any other know species and will be described in detail elsewhere.

017.169   U   **Oh gecko! What big eyes you have**, *Lauren Yetter, Sam Houston State University; Oscar Ospina, Florida State University; Juan D. Daza, Sam Houston State University Natural History Collections*
Gekkotans have the largest eyes among lizards, matched only by some snakes among squamates (e.g., Dipsas, Leptodeira, Ahaetula). In general terms, gekkotans have been an exemplary group for changes on the onset of development of phenotypic traits or heterochrony, in particular paedomorphosis or the retention of juvenile features in adults. Large eyes have been proposed to be result of paedomorphosis in geckos (e.g., Chatogekko) and birds when compared with their non-avian dinosaur ancestors. To test this idea, we studied ontogenetic series of three species of geckos, the sphaerodactylid Sphaerodactylus townsendi (diurnal) and the gekkonids Gekko gecko and Hemidactylus mabouia (nocturnal). We measured the area occupied by the sclerotic ring in specimens and regressed it against jaw length. After calculating the square root of the area, a linear regression model was fitted for each species with area of sclera as the response variable and we tested whether the slope of the linear regressions differed from one. The two nocturnal gekkonids have an allometric scaling of the eye sclera while the diurnal species have an isometric scaling, indicating paedomorphosis. Paedomorphosis in the latter might be reached by deletion of terminal ontogenetic series, and could be consequence of miniaturization.

017.170   U   **Spatial and olfactory components of territorial defense**, *Lauren Nicole Law, Angelo State University; Ben R Skipper, Angelo State University*
Many animals establish zones of exclusion, or territories, to protect valuable resources from others. Existing theory on territorial defense suggests territory owners receive a home advantage through territorial familiarity. The purpose of this study was to investigate how spatial and olfactory familiarity contribute to territorial defense in the house cricket (*Acheta*

domestica). We observed territorial defensive behaviors of male crickets directed at an intruder under three scenarios: spatial and olfactory familiarity, spatial familiarity without olfactory familiarity, and olfactory familiarity without spatial familiarity. The number of calls from each cricket was used as a proxy for territorial aggression. Where spatial and olfactory familiarity were present, the territory holder called more frequently in 7 of 8 trials (88%). When spatial components were rearranged, but scent remained, the territory holder called more frequently in 2 of 4 trials (50%) with the intruded displaying no aggression. When olfactory familiarity was absent but spatial familiarity was present, the territory holder called more frequently in 3 of 5 trials (60%) with the intruder calling more frequently in the other 2 contests. Results suggest that olfactory familiarity promotes greater territorial defense than spatial familiarity, however the combined effects of both provide a distinct home advantage to territory owners.

017.171 U **The effects of static and dynamic warm ups on balance and agility**, *Cheryl Lianne VanDyke, Concordia University Texas; Kaycie Dunkerley, Concordia University Texas; Samantha Mendez, Concordia University Texas; Mary Johnston, Concordia University Texas*

Static and dynamic warm ups are used by athletes to improve balance and agility for competition. Maintaining balance, learning how to recover, and move efficiently are all major components of increasing athletic capacity and preventing injury. This study evaluated whether balance and agility would be positively affected by athletes who perform a series of dynamic backwards movements prior to athletic activity. We evaluated five different types of static and dynamic warmups: backwards running, forward running (both whole-foot and on the ball of the foot), and balancing on a Bosu ball (both whole-foot and on the ball of the foot). Subjects (N=12) then performed three balance and agility tests: the Y-balance reach test, balancing in tree pose on one foot, and velocity while walking on a balance beam. Results were evaluated using repeated measures ANOVA. Individuals tended to have slight, though insignificant (p=0.14), increases in their reach distance after Bosu ball warmups. Individuals also had a slight tendency (p=0.09) to balance longer in tree pose on their non-dominant foot after forward running on the ball of their foot. This research provides intriguing pilot data which would be beneficial to the field of biomechanics, athletes of all levels, and those looking to improve their overall health. Running and warm ups are vital to performance and daily activities, and this type of research can benefit people of all ages, sports, race and gender.

017.172 U **The Effect Diet has on the Behavior of African House Snakes,** *Lamprophis fuliginosus*, *Meranda R Ruiz*

Early life energy intake should impact the adult behavior patterns such as aggressiveness or exploratory behavior. This is because animals with less foraging success should explore more and as a result modify their anti-predator behavior. I tested this in the African house snake, Lamprophis fuliginosus, by raising 22 young on high and low diets. Animals on the high diet ate 30% of their body weight twice a week. Low diet animals received 10% of their body weight for twice a week, for a period of 7 months. Animals at the beginning were not significantly different in length or mass (t= .707 P= 0.217; two tailed). At the end of 7 months there were still no significant differences (t=0.062 P= 0.869; two tailed) . Although the animals were not significantly different at the end I decided to continue to examine their exploratory behavior and aggressiveness. Exploratory behavior was measured via calculating the percent of time animals were outside of their hide box. Results showed there were slight differences in exploratory behavior (t= .151 P= 0.881; two-tail). Aggression was tested near day 200 by attacking the snakes with a face painted on a ball for five minutes and counting the number of strikes. There were no significant differences between high and low diet groups (t= .809 P= 0.429; two-tail). The animals showed large variation in whether or not they ate the food and this could explain lack of significant and expected results.

Saturday, February 29

019. Anthropology Oral Session and Section Meeting
8:00 to 10:00 am
Miller Science Building, Room 139
Anthropology
   Anthropology Oral Session and Section Meeting
Participants:

8:00   **019.173 G** **Aggressive Mimicry as a Human Hunting Strategy**, *Cody J Moser, Texas A&M University*

The expansion of human cognition is a major question in the science of human origins. Several hypotheses have been proposed for its evolution, primarily the Foraging Brain and the Social Brain Hypotheses. Thus far, the Social Brain Hypothesis has much support based on its explanation for the evolution of Theory of Mind (ToM) in which social group size led to the development of `adept mind-reading and human deception in the human species. Alternatively, the Foraging Brain Hypothesis explains cognition through the lens of environmental pressure. Viewed as emphasizing separate sides of the same problem, I propose a potential pathway for the evolution of human deception independent of sociality that can be explained through ecological drivers: that of deception as a human

hunting practice. Utilizing cross-cultural data gathered from the Human Relations Area File, I identified numerous (n=356) cross-cultural cases of the application of a hunting strategy in non-social hunting contexts across 143 cultures. By comparing similar behaviors in non-human animals which utilize a hunting strategy known as aggressive mimicry, I suggest a potential pathway through which the evolution of deception and mind-reading may have taken place. Rather than theory of mind developing from sociality, I suggest social applications of mind-reading in humans could have theoretically followed the development of these applications for foraging contexts. This framework is discussed in relation to paleoanthropological findings and human language evolution.

8:15   019.174   N   **Analysis of southern African Pleistocene rodent humeri from Swartkrans: Members 1-3**, *Timothy Lee Campbell, Department of Anthropology, Baylor University; Thomas J. DeWitt, Texas A&M, Department of Wildlife and Fisheries Sciences; Darryl J. de Ruiter, Texas A&M University, Department of Anthropology*
In this study we extract the suprageneric taxonomic signal present in modern rodent humeri and apply these results to fossils from the Pleistocene site of Swartkrans, Members 1-3 (~2.0 –0.62 Ma). High resolution images of 241 modern specimens representing 5 families (Muridae, Bathyergidae, Nesomyidae, Sciuridae, Gliridae) and 126 fossil specimens were used to digitize humeral outlines. Due to sample size, Sciuridae and Gliridae were grouped at the subordinal level (Sciuromorpha) in analyses. Outlines were subjected to elliptic Fourier analysis from which 120 harmonic coefficients were calculated representing shape information invariant to size, location, rotation, and outline origin. Harmonic coefficients were subjected to principal components (PC) analysis with fossil specimens rotated to the PC axes. Nineteen axes accounting for 98% of modern shape variance were retained. Modern shape differences were tested using MANOVA on PC scores, and classification success was calculated using linear discriminant function analysis (LDA). Results from the LDA were used to classify fossil specimens. Modern specimens were found to differ strongly in shape ($\eta^2 = 0.82$; $P < 0.01$), and 88% correctly classified using cross-validation. To explore potential family level signal within Sciuromorpha, a follow-up PCA was run using linear measurements of humeral length and epicondylar breadth, with the fossil specimens treated as above. Resulting PC plot shows fossil specimens clustering closest to the glirids suggesting they should be classified as such. This study demonstrates that higher level taxonomic signals are present in southern African rodent humeri and suggests that similar studies

of additional elements are warranted.

8:30   019.175   U   **Continued analyses of the unidentified avifaunal humeri from Swartkrans, Members 1-3**, *Margaret Klausmeyer, Department of Anthropology, Baylor University; Thomas A. Stidham, Key Laboratory of Vertebrate Evolution and Human Origins, Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences; Timothy Lee Campbell, Department of Anthropology, Baylor University*
In this study, we provisionally identify additional new avifaunal remains from the hominin-bearing site of Swartkrans, South Africa, using the gross morphology of complete humeri. Members 1-3 of Swartkrans represent the oldest currently known deposits within the cave system, dating collectively from 2 Ma to 0.64 Ma. Earlier studies of the avifaunal remains from Members 1–3, a total of seven orders and 11 families were identified, although most of the material was recovered from Member 3. A review of the catalogued specimens accession numbers revealed that the complete humeri analyzed here did not come from units/spits examined in the earliest studies, and so represent previously unidentified and unpublished specimens. Recent work has identified four new orders and families among the Swartkrans paleontological assemblage. Continuing on with this work, in the present study humeri were again used for identification as this element is well represented in the assemblage and has a characteristic morphology that can often be identified to the family level. Unidentified specimens were compared to digital images of previously catalogued specimens from previous work. Notable identifications from this new work include additional swifts (Apodidae), a lovebird (Psittacidae), and a buttonquail (Turnicidae), along with potential shorebirds (Charadriiformes), quail (Phasianidae), and one possible rail (Rallidae). The bird assemblage contains representatives from a variety of habitats including grassland, forest/woodland, wetlands, and the cave itself. This study adds to our understanding of the avian diversity represented in the Swartkrans fossil assemblage, and to the known avian diversity in southern Africa during the early Pleistocene.

8:45   019.176   G   **Preliminary analyses of archaeological pollen from the Casma Site of El Campanario, Huarmey, Peru**, *Paloma Cuello del Pozo, Texas A&M University; Jose L. Peña, University of South Florida*
Our exploration focuses on issues regarding archaeological palynology and present a case study using a preliminary set of pollen samples from El Campanario Archaeological Project in Huarmey, Peru. The majority of the samples used in this analysis were obtained from an architectural platform, which has been

C14 dated to 1150-1280 AD. The prevailing hypothesis suggests the site was occupied by the Casma people. This project has revisited Bryant and Hall (1993), who published a set of protocols showing the potentials of palynological analyses to further elucidate aspects of occupation, landscape use and subsistence strategies among ancient cultures. Since this project is preliminary, we have limited our discussion to presence/absence data of pollen families recovered to date at the site. In archaeological layers, the preservation of paleobotanical micro-remains is often poor, which poses an obstacle during taxonomic identification. Some of the most common identifiable grains in El Campanario include maize and some members of the legume family. The findings of these cultivars within occupational layers of this platform provides insights for archaeologists to better interpret the cultural activities that could have been performed during the occupation of the site.

9:00   019.177   U   **A Test of Sex, Age, and Ancestry Differences in Auricular Surface Outline Shape**, *Ryan O Martinez, Department of Anthropology, Baylor University; Timothy Lee Campbell, Department of Anthropology, Baylor University*
In this study, we test for shape differences in the pelvic auricular surface. Age changes in auricular surface morphology are well documented and used in the fields of forensics and bioarchaeology to generate age estimates. Additional studies have explored sexual dimorphism associated with the auricular surface, such as the presence or absence of a preauricular sulcus, however, this feature alone is not always indicative of an individual's sex necessitating the use of other features when making sex determinations. As such, the ability of the auricular surface to inform on an unknown individuals sex, as well as other aspects of the biological profile, remains largely untested. In this study we use 2D Geometric Morphometrics to test for sex, age, and ancestry differences in auricular surface shape. Specimens used in the study are housed at the Grady Early Forensic Anthropology Laboratory, Texas State University. A total of 81 specimens of known age (15-102), sex (43 males and 38 females), and ancestry (Hispanic, Black, and White) were examined. To assess age differences, specimens were grouped into nine age cohorts based largely on groupings used in previous studies. Outline data were acquired from standardized, digital photographs of the auricular surface and shape variables generated using Elliptic Fourier Analysis. Shape variables were then distilled utilizing Principal Component Analysis, differences between sex were tested using MANOVA, and classification rates assessed using Canonical Variates Analysis (CVA). Results from our analysis showed no significant difference in sex and ancestry, however, a significant difference between age cohorts was recovered.

020. Cell and Molecular Biology Oral Session 1
8:00 to 10:00 am
Bush Mathematics Building, Room 101
Cell and Molecular Biology
    Cell and Molecular Biology Oral Session 1
Participants:

8:00   020.178   U   **A9 Cells Display more Carcinogenic Characteristics than Mutated PA28γ Knockout Cells**, *Brandon Mai, Austin College; Khanh Nguyen, Austin College; Addie Pederson, Austin College*
PA28γ is a proteasome activator that has been positively correlated with cancer, however the mechanisms behind the PA28γ link to carcinogenesis remains unclear. This study was a comparison of mouse A9 cells to mutated PA28γ knockout MEF cells (KOCC3) to determine their carcinogenic characteristics. Gene sequencing revealed that neither A9 nor KOCC3 cDNA had any missense mutations in p53, h-ras, pten, or akt1. Both the scratch and migration assays revealed that both cell types exhibited migration, but the A9 cells migrated more. In the viability test, it was observed that A9 cells showed resistance to Colchicine and Taxol while the KOCC3 cells did not. Taken as a whole, these results indicate that A9 cells behave more cancer-like than KOCC3, indicating perhaps a lack of PA28γ made it difficult for KOCC3 to obtain cancer hallmarks such as genomic instability and mutation, activating invasion and metastasis, and resisting cell death.

8:15   020.179   U   **Colorado tick fever virus induces NF-kB and HMGB1 activation in the human microvascular endothelial cell line HMEC-1**, *Luis Angel Grado, Sam Houston State University; Jeremy Bechelli, Sam Houston State University*
Colorado tick fever virus (CTFV) is a member of the Family *Reoviridae* and genus Coltivirus. Like all Reoviridae, CTFV is a non-enveloped double-stranded RNA virus with a segmented genome enclosed within two capsids. Documented reports of Colorado tick fever (CTF) include biphasic fever, headache, myalgias, photophobia, often a petechial rash, and rarely hemorrhagic fever, meningoencephalitis, and even death. Currently, 20% of patients require hospitalization yet very little is known about the mechanisms underlying the pathology of CTF. Our current research shows that CTFV induces apoptotic cell death mediated caspase enzymes. Other studies have shown that reoviruses activate apoptosis using the transcription factor nuclear factor kappa B (NF-kB) and lead to the release of High mobility group box 1 (HMGB1), a pro-inflammatory cytokine released in response to injury or infection. To identify host cell factors that mediate apoptosis and inflammation in human endothelial cells, we investigated whether CTFV infection alters the

activation state of NF-kB and leads to the downstream secretion of high-mobility group box-1 (HMGB1) using confocal fluorescence microscopy. In cells infected with CTFV for 24 hours, we demonstrate that RelA translocates from the cytoplasm to the nucleus which is indicative of NF-kB activation. Furthermore, cells infected with CTFV show a potent translocation of HMGB1 from the nucleus into the cytoplasm. Taken together, our data suggests that CTFV induces NF-kB activation and HMGB1 which may contribute to disease progression during CTF.

8:30   020.180   U   **Expression analysis and RNAi silencing of an immune gene in the lone star tick**, *Jacquelyn M May, Stephen F. Austin State University; Lindsay M Porter, Stephen F. Austin State University*
The lone start tick is an aggressive tick species, readily biting humans and a vector of disease-causing pathogens of public health importance. Despite its known role in vectoring bacterial pathogens, how this species responds immunologically to bacteria is not well known. In this study, we investigated a gene previously shown to be responsive to LPS, Tumor Necrosis Factor Receptor Associated Factors (TRAF) that has been validated as immune-related in other arthropods. We analyzed expression of this gene before and during gram-negative and gram-positive bacterial infection in both male and female ticks. We also prepared expression constructs for the in vivo production of dsRNA for RNAi. We find that expression is ubiquitous and does not appear to be more abundant throughout 24 h of infection in qualitative PCR analysis. The effects of silencing on hemocyte response and on infection load are discussed. It is important to understand the way ticks react to non-pathogenic bacteria in order to eventually look into how they respond to human pathogens. Eventually this could lead to being able to manipulate the genes in order to control these vectors.

8:45   020.181   G   **Activation of Apoptosis in Human Endothelial Cells Infected with Colorado Tick Fever Virus**, *Sarah Owen, Sam Houston State University; Jeremy Bechelli, Sam Houston State University*
Colorado tick fever virus (CTFV), the causative agent of Colorado tick fever, has a double stranded segmented genome and is in the Family *Reoviridae* and genus *Coltivirus*. Symptoms of infection include diphasic fever, headache, myalgia, petechial rash, meningoencephalitis, hemorrhagic fever, and death in children. Disease severity results in approximately 20% of patients requiring hospitalization highlighting a need to better understand this neglected virus. However, the mechanisms underlying CTFV induced pathology and severe complications remain unknown. Because CTFV is spread by tick bite and disseminates systemically, we examined the interactions between endothelial cells

(ECs) and CTFV *in vitro*. Our findings indicate that dermal microvascular EC line, HMEC-1, is susceptible and permissive to CTFV infection. To investigate the role of CTFV infection on endothelial barrier function, we assessed transendothelial electrical resistance and observed a dose dependent decrease in vascular permeability starting at hour 17 (MOI=1.0), or hour 26 (MOI=0.1). HMEC-1 cells infected with CTFV at 24 and 48 hours demonstrate caspase-3/7 activation and inhibition of caspase-3/7 reduces cell death in infected cells. Furthermore, HMEC-1 cells infected with CTFV at 48 hours revealed significantly increased Annexin V staining and reduced viability compared to uninfected controls suggesting CTFV induces apoptotic cell death in human ECs. Overall, our data suggests that caspase-3/7 mediated apoptosis is a critical mechanism by which CTFV induces disease in the host.

9:00   020.182   U   **Screening for Novel Regulators of Cancer Cachexia in *Drosophila melanogaster***, *Alyssia Gabbard, Sam Houston State University; Cheyenne Jennifer Evesson, Sam Houston State University; Immaculate Fri, Sam Houston State University; Mardelle Atkins, SHSU Assistant Professor*
Cachexia is the wasting of fat and skeletal muscle that is triggered by disease. What causes cachexia remains a vastly underexplored area of science despite its devastating effects on a large fraction of cancer patients and their families. In recent years, the model organism *Drosophila melanogaster*, also known as the fruit fly, has emerged as a platform to study and solve these unanswered questions due to the diverse genetic tools available in this system and its high degree of genetic conservation with humans. This study uses a novel tumor model in *D. melanogaster* to generate genetically defined tumors in larvae that induce cachexia-like loss of fat and muscle. Previous work with this model has given insight on gene expression within the tumors. Using this information, we selected 99 conserved candidate genes to perform a screen for novel regulators of cachexia. We have thusfar tested the effects of 30 candidates by knocking down their expression using in vivo RNA interference (RNAi). Hits were determined through a visual screen comparing unmodified tumor larvae versus the tumor larvae with the knockdown. RNAi lines that reduce wasting phenotypes but not the tumor growth were dissected and stained to determine fat and tumor morphology. Out of the 30, 3 genes showed specific reduction of the wasting phenotype and are selected for further investigation. Therefore, using this approach, we may have identified several novel regulators of a tumor-induced cachexia phenotype.

9:15   020.183   U   **A Method to Investigate Tumor-Induced Wasting in *Drosophila melanogaster***, *Cheyenne Jennifer Evesson, Sam Houston State University*

Many types of cancers induce a wasting called cachexia which involves a loss of both muscle and fat. This condition can often make the patient sicker, weaker, and less likely to recover. There has yet to be an explanation as to why or how these tumors cause wasting to occur. Using *D. melanogaster*, a tumor model that induces a cachexia-like wasting has been created. Using this fly line, we are performing a genetic screen to identify genes whose expression in tumors trigger wasting. One of the most obvious phenotypes in larvae with tumors are the wasted and delicate fat bodies. I have developed a way to separate them from surrounding structures with minimal to no damage. They have drastic morphological changes that can be quantified after staining with the lipophilic fluorescent dye Nile Red. This dye binds specifically to intracellular lipid droplets so that they can be better examined under a confocal microscope. Being able to analyze the fat bodies in these cachexia-like wasted larvae can help in identifying any RNAi lines which lessen the wasting effects of the tumor. Identification of any knockdown genes causing rescuing of this wasting could be useful in further human tumor induced cachexia studies.

9:30   020.184   U   **Resolving an insect-specific toxin sequence in the brown widow spider**, *Darrian Simone Frausto, Stephen F. Austin State University; Lindsay M Porter, Stephen F. Austin State University*
The brown widow spider, (*Latrodectus geometricus*) is an invasive widow species with a quickly expanding distribution. Despite becoming more commonplace, little is known about its venom toxicity and the only sequence information for these toxins in public databases is unassembled read data. In this study, we aimed to determine the sequence of the alpha-latroinsectotoxin (α-LIT) from this species. We used wild-caught spiders to extract total RNA and prepared cDNA for use in PCR amplification. Primers for PCR were designed using the read data available in GenBank that was probed using an α-LIT from a related species and amplicons were purified and submitted for sequencing. Using this methodology, we have successfully sequenced 3,623 bp ($\sim 60\%$) of a predicted 4,233 bp, leaving $\sim$610 bp to be determined including 5' and 3' ends. Based on the sequence already obtained, BLASTX shows more than 80% similarity to the homolog in the Mediterranean black widow and a CDD search confirms the presence of the ankyrin repeat domains that characterize LITs. Once the full sequence is resolved future directions include recombinant protein expression for toxicity assays that will evaluate this toxin as a potential biopesticide.

9:45   020.185   U   **Identification of Antibiotic Resistant *Pseudomonas monteilli* and the Utilization of Bacteriophage in Cell Lysis**, *Taylor L Authement,*

Del Mar College
Taylor L. Ojeda, Tara L. Clancy, John F. Ramirez, Lori Leyva, J. Robert Hatherill and Daiyuan Zhang Del Mar College We have a global health crisis in which common infections are becoming extremely hard or impossible to treat due to increasing prevalence of antibiotic resistant microbes. Recently an alternative therapy using bacteriophage (phage) has demonstrated success in treating antibiotic resistant bacterial infections. Phage attack only their specific bacterial hosts. In this study, the protocol from undergraduate research program Prevalence of Antibiotic Resistant bacteria in the Environment (PARE) is used to isolate an antibiotic resistant bacterium from a soil sample. The bacterium was identified as Pseudomonas monteilli through colony PCR of 16s rRNA gene and DNA sequencing. A phage that was previously discovered using Pseudomonas pseudoalcaligenes, proved to be able to infect Pseudomonas monteilli. Transmission electron microscopic (TEM) image of this phage suggested its morphology as Myoviridae. The phage also displayed a lytic cycle during this study, indicating that it could be a potential candidate to treat infections cause by Pseudomonas pseudoalcaligenes or Pseudomonas monteilli.

021. Chemistry and Biochemistry Oral Session 2
8:00 to 10:00 am
Miller Science Building, Room 234
Chemistry and Biochemistry
    Chemistry and Biochemistry Oral Session 2
Participants:

8:00   021.186   U   **Identifying a Simple Catalytic System for the Oxidative Functionalization of C-H Bonds**, *Bailey Jameson, Stephen F. Austin State University; John Brannon Gary, Stephen F. Austin State University*
Non-heme iron-oxo enzymes are one important class of biological enzymes capable of oxidizing carbon-hydrogen bonds. Given the potential synthetic and industrial chemistry applications of the oxidation of organic molecules, this class of enzymes has been heavily studied regarding the design of new catalytic systems. Many simple models of these enzyme active sites have been made using tetradentate nitrogen ligands, tris(2-pyridylmethyl) amine (TPA) being a commonly used ligand. In an effort to improve catalytic efficiency, TPA has been compared with other ligand systems such as bis-pyridyl-dimethylethylene diamine (BPMEN). This presentation will describe modifications of these ligand systems and their implications to catalytic efficiency. A unique method of catalyst preparation will also be described which greatly simplifies the overall utilization of these systems in catalysis. The impact of temperature, reaction conditions, and C-H bond substrate will be

discussed in regards to catalytic reactivity, efficiency, and selectivity.

8:15   021.187   U   **Innerworkings of Protein Purification: Binding of Ni-IDA to His Tags**, *Cole B Donald, Stephen F. Austin State University; Brian Barngrover, Stephen F. Austin State University*
Binding energy is referred to as the energy required to keep a molecule together or to separate a molecule. This project revolves around the analysis of the binding energies from various combinations of nickel IDA and histidine tags. From the calculated enthalpy of the reactions, the exact binding energy required to keep the molecules together and the energy to separate them, can be identified.

8:30   021.188   N   **Lanthanide Organic Frameworks Using Multiple Linker Systems**, *Ralph Zehnder, Angelo State University*
The combination of terephthalate (TP) with glutarate (Glut) and neodymium(III)-ions under hydrothermal conditions leads to an open framework of formula [Nd2(Glut)2(TP)(H2O)4]•17H2O. This network possesses a rather high level of symmetry and due to the ordered arrangement of linkers fairly large channels, as commonly desired for metal organic frameworks. A derivative of this compound can also be synthesized via integration of TP and 2-aminoterephthalate (TPNH2) resulting in a mixture of TP and TPNH2. This introduces a functional group into the lattice, without altering the structural properties of this coordination polymer whatsoever [Nd2(Glut)2(TP)x(TPNH2)y(H2O)4]•17H2O, with y= 1-x). Complete substitution of TP with TPNH2 leads to the pure [Nd2(Glut)2(TPNH2)(H2O)4]•17H2O analog. Utilizing slow diffusion methods at room temperature with an array of solvent mixtures allowed the extension of this synthesis to the Ce, La, Pr, and the Sm-analogues. Reacting one dicarboxylate linker at a time often results in rather crowded structures with the lanthanide(III) ions due to their large coordination numbers. One way to overcome this challenge is the addition of entities that will restrict linkage in all directions, such as monocarboxylates, 1,10-phenanthroline, 2,2′-bipyridyl, etc. In this work we will show our recent success in creating additional lanthanide organic frameworks with the inclusion of such organic systems.

8:45   021.189   N   **Mechanistic Study of CO Releasing Reactivity of Bis-bipyridyl Flavonolato Ruthenium (II) Complexes**, *Xiaozhen Han, Stephen F. Austin State University*
A series of bis-bipyridyl Ru(II) complexes with flavonol derivative ligands were prepared and fully characterized. Treatment of dry CH3CN solutions of Ru-bound flavonolate complexes with O2 under light leads to oxidative O-heterocyclic ring opening of the coordinated substrate flavonolate, resulting in the formation of CO and Ru-bound 2-benzoatophenylglyoxylate complexes, as determined by ESI MS. Singlet oxygen as a possible reactive intermediate has been ruled out. Instead, we suggest a SET (single electron transfer) mechanism between ruthenium bis-bipyridyl flavonolate complexes and oxygen. For the formation of the oxygenation product [RuII(bpy)2bpg]+ (bpg = 2-benzoatophenylglyoxylate) we were able to detect a 1,2-dioxetane intermediate by chemiluminescence spectroscopy. Both the product and the intermediate suggest that the oxygenation mechanism is through 1,2-dioxetane intermediate rather than a 1,3-endoperoxide pathway.

9:00   021.190   N   **Modifying Materials Prepared from Ring Opening Metathesis Polymerization (ROMP)**, *Christopher Hobbs, Sam Houston State University*
This talk will describe our recent efforts at the utilization of various "click" reactions to modify materials derived from ROMP reactions. These reactions provide products in complete conversion and high yields. Linear, graft, pendant-and terminally-functionalized polymers can be obtained. Further, these processes have been adapted to both mechanochemistry and continuous flow reactor setups.

9:15   021.191   G   **Nanoliter-Volume KOH Eluent Generator for Small Bore Capillary Ion Chromatography**, *Bikash Chouhan, University of Texas at Arlington; Purnendu Sandy Dasgupta, UTA*
In Anion Chromatography, an alkali hydroxide is the preferred eluent as it can be converted into pure water when the cation is exchanged for H+ at a device called the suppressor. The suppressed background of pure water has a very low background conductance and thus provides very high sensitivity for conductometric detection of strong acid anions that leave the suppressor as the corresponding strong acids. In addition, an eluent gradient, i.e., when the hydroxide concentration is increased during the run, does not result in a change of the background conductance, which remains pure water. Manually prepared KOH is often contaminated with carbonate. This affects the gradient background. In addition, the carbonate content changes over time due to continued absorption of atmospheric CO2 changing eluent characteristics over time. We describe here a nano-eluent generator for online production of gas free, high purity KOH suited to be used in small bore Open Tubular Ion Chromatography. The eluent generator is made inside a miniature cross fitting. A 1 mm diameter bipolar ion exchange membrane (BPM) disc is placed inside one of the cross ports with the anion side facing inwards. Similarly, a cation exchange membrane (CEM) disc is placed on the opposite cross port. The KOH feed is circulated on the exterior sides of each

membrane with the positive electrode placed on the exterior of the CEM and the negative electrode placed on the exterior of the BPM. The eluent generation chamber has an active volume of ~ 300 nL.

9:30 021.192 G **Novel Flexible Moldable Ion-Exchange Polymers**, *Fereshteh Maleki, UTA; Purnendu Sandy Dasgupta, UTA*

Ion exchange membranes (IEMs) play a key role in the diverse applications and address many issues in the field of alternative energy and separation science for example from energy conversion and production like fuel cells to environmental issues. So, the field of ion exchange membrane is a great area with attractive industrial and public health significance. Though many ion-exchange polymers have been synthesized, there are not many commercial IEMs. Nafion□, a perfluorosulfonate ionomer developed by DuPont in the '60s, has been most commonly used for research purposes. Its high chemical stability and good transport properties have made it the benchmark cation exchange membrane (CEM) despite its high cost. Availability as a colloidal solution permits coating and casting applications. In 2005, a CEM made from polyvinyl alcohol (PVA), polystyrene sulfonic acid (PSSA) and maleic acid/maleic anhydride (MA) with glutaraldehyde (GA) as a cross-linker was reported. Later studies focused on improving the performance of the PVA-PSSA/MA membrane for fuel cell applications. Here we report a flexible moldable cation exchange polymer with high specific conductivity, good chemical stability, and mechanical strength. The prepolymer cocktail can be cast in a mold or around a mandrel and then polymerized to produce tubular channels. Microscale devices thus made can then be fashioned into chemical or electrodialytic suppressors for ion chromatography (IC) or electrodialytic pure chemical/eluent generators.

9:45 021.193 G **Rapid, Inexpensive Fabrication of Variable Geometry Resistance Thermometers and Applications with Flowing Solutions**, *Andrew Franklin, University of Texas Arlington*

A rapid and inexpensive fabrication technique for high value resistance thermometers has been developed. It has been found that a near-IR fiberoptic laser engraver is capable of selectively ablating a thin (70 – 100 nm) aluminum layer from a Kapton film substrate; such aluminized Kapton films are commercially available. Serpentine resistor patterns, with feature widths less than 100 μm, can be repeatably produced in minutes to yield sensor resistance values on the order of 4 kΩ from a 2 mm x 8.5 mm area. Sensor geometry is readily varied, and networks of sensors can be easily configured. A simple test for sensitivity in a flow over configuration is to neutralize plugs of various acid concentrations with a constant stream of base and detect the heat evolved by the reaction. To detect such temperature changes in a flowing solution, a paired set of differential resistance thermometers (DRTs) were designed in conjunction with a trident shaped neutralization channel. The channel is cut in a double-sided adhesive Kapton Tape and is enclosed by a ceiling of HDPE and the bottom side of the Kapton substrate of a DRT. The two outer arms are a continuous base stream and a water stream with periodic acid plugs. The point at which all three arms meets is a passive mixing junction, which outlets at the middle arm. A 3kΩ reference sensor has been placed under the water stream, and a 4kΩ detecting sensor has been placed under the middle arm downstream of the passive mixing junction.

022. Freshwater Science Oral Session 1
8:00 to 10:00 am
Miller Science Building, Room 137
Freshwater Science
    Freshwater Science Oral Session 1
Participants:

8:00 022.194 N **A thirty-year assessment of the endangered aquatic macrophyte, *Zizania texana*, in central Texas**, *Jackie Poole, Sul Ross State University; Jeffrey T Hutchinson, University of Texas at San Antonio; Christopher Hathcock, US Fish and Wildlife Service*

Texas wild rice is an endemic, federally endangered aquatic macrophyte known only from the upper San Marcos River in central Texas. Annual surveys of Texas wild rice coverage have occurred from 1989 to 2018. Texas wild rice exhibited a progressive increase in coverage from 1989 to 2018, but coverage increased significantly ($P < 0.001$) following 2013 when plantings began. Following planting of Texas wild rice, we observed a strong positive relationship ($R2 = 0.84$) with increases in coverage to the number of Texas wild rice planted per year. The most significant ($P < 0.05$) increases in Texas wild rice coverage occurred in six of the seven upper sections of the river, while significant ($P < 0.05$) decreases occurred in five of the seven lower sections of the river. There was no correlation between Texas wild rice coverage and mean ($r = 0.13$), minimum ($r = 0.18$), and maximum ($r = -0.08$) discharge rates. The maximum discharge recorded during the survey was 175 m3 s-1 in 1998, which resulted in a 15.6 % decrease in coverage during the 1999 survey, but Texas wild rice coverage increased during 2000. This endangered macrophyte exhibits resilience and resistance to high discharge events due to its fast growth rates, reproductive plasticity, high root-to-shoot ratios, and a perennial life cycle that contributes to its fast recovery following scouring. Decreased spring flows due to increased water extraction represents the greatest threat to the only

known population of Texas wild rice.

8:15   022.195 N   **Zebra mussel settlement, density, survival, and growth in a recently invaded Texas reservoir**, *Jason L Locklin, Temple College; Devin N. Corbitt, Temple College; Robert F. McMahon, University of Texas Arlington*

Zebra mussels were first introduced to US freshwaters in 1986. They have since spread southward and, as of 2019, occur in 17 Texas reservoirs occupying the lowest latitudes in their North American and European range. Little is known of zebra mussel population dynamics in warm systems, knowledge of which will be important for development/implementation of effective mussel management/control strategies. Zebra mussels were first discovered in Belton Lake in 2013 and developed a dense population by 2014. Belton Lake mussel settlement dynamics were studied from March 2016 – May 2017 on steel chains suspended from a marina to the sediment. Three chains were deployed bimonthly with mussel densities recorded monthly thereafter at each meter of depth. Growth rates and densities were also determined at various sites around the reservoir following a 52-day period of high water during late spring. Two annual reproductive periods were detected: settlement of a spring cohort occurred from June – September 2016 and fall cohort settlement from November 2016 – May 2017. Peak spring and fall cohort settlement densities were 1,025 ±87 mussels m-2 in Oct 2016 and 175 ±159 m-2 in Dec 2017, respectfully. Surface water hypoxia from late summer/early fall of 2016 extirpated the spring cohort. Mean mussel settlement density increased with distance downstream from 0 mussels m-2 in the reservoir's shallow, inlet to 21,160 mussels ±13,630 m-2 at its deeper wider outlet. Mean mussel shell growth rates across six sites were 127.9 ±0.013 μm day-1, one of the fastest recorded for mussels in Europe and North America.

8:30   022.196 U   **Invasive zebra mussel settlement and density comparisons in two geographically-close central Texas reservoirs**, *Josiah S Moore, Temple college; Brittany L Lokcu, Temple College; Samuel Poster, Temple College; Jason L Locklin, Temple College*

Dreissena polymorpha (zebra mussels) are among the most successful and destructive invasive species in N. America. They are highly adaptable filter feeders that can colonize bodies of freshwater at alarming rates. Zebra mussels were first introduced to the Great Lakes in 1986 and first reported in north Texas in 2009. They continue to expand southward and currently infest 17 Texas reservoirs. To better understand the population dynamics at southern latitudes, we are studying the invasive mussels at two central Texas reservoirs approximately 8.6 km apart: Stillhouse Hollow Lake,

an impoundment of the Lampasas River, and Belton Lake, an impoundment of the Leon River. To compare densities between the two lakes, four sets of 20X20 cm plates (4 replicates per set) were suspended bimonthly from a floating marina in each lake at four equally-spaced depths from surface to sediment. Samplers were assessed monthly to estimate mussel densities and settlement through time at the various depths. Water temperature and dissolved oxygen were logged hourly at three depths at both sites, and chlorophyll a quantity was measured monthly as a proxy for lake productivity. Preliminary results from Fall 2019 suggest that mussel densities are higher at Stillhouse Hollow Lake. Mussels are also denser near the surface at Stillhouse Hollow with little variation in density across depth at Belton Lake. If such differences hold throughout the remainder of the study, an assessment of water quality parameters may shed some insight into the factors governing the population dynamic differences in the two nearby infested systems.

8:45   022.197 G   **A comparison of benthic invertebrate composition between ephemeral pools and permanent pools along upper Leon Creek**, *Alexander Tugay Toder, University of Texas at San Antonio; Jeffrey T Hutchinson, University of Texas at San Antonio*

Ephemeral pools can be considered small natural aquatic habitats with large ecological roles. These habitats are common on most continents but are most prevalent and ecologically important in arid and semi-arid regions where water sources may be scarce. Ephemeral pools are typically characterized by their relatively small size, abundance across hydrologically influenced landscapes, and are highly variable in shape, structure, and depth due to hydrological changes. Due to extremes in hydroperiod (period of inundation), ephemeral pools harbor unique communities of organisms with adaptations for highly inconsistent environmental conditions. Leon Creek within San Antonio, Texas, serves as a tributary within the San Antonio River Basin. It is composed of fragmented flowing water sections interspersed with isolated pools that connect during significant precipitation. These isolated pools are ephemeral and have been studied very little, if at all. This study examines the community composition of aquatic invertebrates within upper Leon Creek using a semi-quantitative method between the months of June 2019 to September 2019. Benthic invertebrate samples and water quality parameters were collected each month from eight ephemeral pools and two permanent pools of differing size, depth, and hydroperiod, and identified to the lowest practical level. Invertebrate composition of these pools can help us understand how invertebrate communities change in relation to the ephemerality of urban streams. Further, results from this study can provide insight into the

environmental health of Leon Creek and allow for more informed management strategies within the area.

9:00   022.198   U   **How can DNA help us with conservation in San Solomon Springs?**, *Dominique Alvear, University of Texas Rio Grande Valley; Kathryn Perez, University of Texas Rio Grande Valley; Weston Nowlin, Texas State University; Chris Nice, Texas State University*

In West Texas, springs or cienegas provide an oasis in the desert and support rich ecosystems that are unique to each spring group. These ecosystems include a group of snails that rely on groundwater for their habitat and consequently are highly susceptible to changes in their water supply such as decreases or cessation of flow or contamination of their local water source. Accurate data on population sizes, migration among populations, and recent changes in population size are a vital component of the habitat conservation plans for endangered species. We used Genotyping-by-Sequencing (GBS) to collect data on migration of the Phantom Tryonia (*Tryonia cheatumi*). This data allows us to determine the level of gene flow among springs of the spring group.

9:15   022.199   G   **Characterization of stormwater pollutant transport prior to Low Impact Development installation.**, *Eugene Von Bon, University of Texas at San Antonio; Brian Laub, Univeristy of Texas at San Antonio*

San Antonio, Texas (USA) is a rapidly growing city and will likely continue to grow for the foreseeable future. As expanding urban development accelerates watershed alterations, low impact development (LID) best management practices (BMP) will become increasingly necessary to mitigate the effects of impervious cover on water quality in streams and aquifers. Thus, understanding BMP efficacy is an important research goal. Here, we present results from the pre-construction phase of a monitoring project that will test a BMP's efficacy on the University of Texas at San Antonio campus. Our study area is a 292 meter long stormflow track draining an area of impervious cover and traversing through a grass-lined channel before converging with other channels. We collected pre-construction stormwater samples from July 2018 to April 2019. We examined correlations between nine water quality analytes. We also examined the change in concentrations for the analytes at two locations (entry and exit of the stormflow channel). We found dissolved solids strongly correlated with conductivity and organic carbon, and moderately correlated with calcium and magnesium, while suspended solids strongly correlated with phosphorus and pH and moderately correlated with nitrogen. We also found that acidity, conductivity, and concentrations of dissolved solids and organic carbon increased as stormflow traveled downstream while suspended solids decreased. The overall improvement in water quality was minor along the grass-lined channel. Future research on this site will seek to answer if the upstream/downstream changes and correlations in analyte concentrations improve as a result of the LID BMP installation.

9:30   022.200   G   **Mercury contamination characterized by microbial mercury methylation genes in Martin Lake, East Texas**, *Sharon Schmidt, University of Texas at Tyler; Javid McLawrence, Texas A&M AgriLife Research, Department of Soil and Crop Sciences, Texas A&M; Anil Somenahally, Texas A&M AgriLife Research, Department of Soil and Crop Sciences, Texas A&M; Ri-Qing Yu, Department of Biology, University of Texas at Tyler*

Four coal-fired power plants located in East Texas are ranked in the top six atmospheric mercury emitters in the United States. The number one emitter, Luminant's Martin Lake Steam Station, is located on Martin Creek Lake in Martin Creek Lake State Park in Tatum, Texas. The power plant emits atmospheric mercury (Hg) while burning coal to generate electricity. It also uses the lake water to cool the plant, then releases it back into Martin Creek Lake. The atmospheric Hg emitted from the Martin Lake Station may drop on Martin Creek Lake; however, the fate and concentration of Hg in the lake ecosystem has not been studied. Inorganic Hg in the sediment could be methylated by anaerobic microbes into neurotoxicant methylmercury (MeHg), although the dominant groups of Hg methylating microbes are unknown in the lake. This toxic form of mercury can bioaccumulate along the aquatic food web, potentially causing detrimental health risks on local populations. We investigated sediment, lake water, and pore water samples in Martin Lake in October 2019. Biogeochemical analyses of sulfate, iron (III), total organic content, and others showed that sulfate level in Martin Lake fluctuated among different sampling sites. After extracting genomic DNA from sediment samples, we are also conducting detection and quantification of Hg methylating genes *hgcA* in various sites around the lake. It is hypothesized that sampled areas surrounding the power plant will have higher concentrations of MeHg and more abundant *hgcA* genes due to atmospheric deposition and cooling water runoff from the power plant.

023. Plant Biology Oral Session 2 and Section Meeting
8:00 to 10:00 am
Miller Science Building, Room 233
Plant Biology
    Plant Biology Oral Session 2 and Section Meeting
Participants:

8:00   023.201   G   **Phylogenetic Analysis of New World Cypresses (*Hesperocyparis*; Cupressaceae)**

Using Noncoding Regions of the Chloroplast Genome, *Alexander Sholl, Lamar University Department of Biology; Randall Terry, Lamar University Department of Biology*
Previous studies of phylogenetic relationships among the New World cypresses (Hesperocyparis; Cupressaceae) have recovered well-supported relationships among the more ancient lineages of the genus. Among these are the two defining clades of *Hesperocyparis*: the Macrocarpa clade, which is comprised of six species endemic to California, and the Arizonica clade, which is a more widely distributed clade of eight species found in the interior of western North America and Northern Mexico. Relationships among closely related species within the Macrocarpa and Arizonica clades however have been poorly supported using available data and some remain uncertain. In this study, comparative sequencing of three intergenic spacers (accD-rpl23, rps12-clpP, and ycf1-trnL) from the chloroplast genome are used to assess interspecific relationships within the Macrocarpa and Arizonica clades of Hesperocyparis. Parsimony and Bayesian analyses of nearly 3 kilobase pairs of aligned sequence supports previously described relationships among the fundamental lineages of the genus and provides additional resolution of interspecific relationships within the Macrocarpa and Arizonica clades. The data presented here combined with previously published noncoding sequences from the chloroplast genome provides the most well supported hypotheses of relationships among the New World cypresses published to date.

8:15   023.202   N   **Updating the conservation status of *Echinacea atrorubens* (Asteraceae) to inform conservation efforts**, *Erin Flinchbaugh, Botanical Research Institute of Texas; Kim Taylor, BRIT*
Echinacea atrorubens (Asteraceae) is a rare species of *Echinacea* native to Texas, Oklahoma, and Kansas. The plant was given a NatureServe Conservation Status Rank of Vulnerable (G3S3) as of 27 Feb 2000. As Vulnerable, a plant is considered at "moderate risk for extinction due to relatively limited range, relatively few populations, and/or clear decline". An updated assessment methodology has been put in place since this evaluation with more structured guidelines. We used historical specimens, crowd-sourced observations from iNaturalist, and in-field verification of populations to re-evaluate this status. Our recent evaluation found Imperiled (G2S2) to be a more accurate representation of the current conservation status of *E. atrorubens*. This means that it is at high risk of extinction, in this case because of its limited range and present threats. With this in mind we sought to increase conservation efforts for the species. We have now collected and preserved seed from two separate *E. atrorubens* populations in the Botanical Research Institute of Texas (BRIT)

Conservation Seed Bank. By collecting seed, we preserve genetic diversity and aid future restoration efforts. Population data will also be submitted to the Texas Natural Diversity Database (TXNDD) to help protect populations *E. atrorubens* from future development projects. The change in conservation status of this rare Texas species highlights the importance of updating conservation status ranks for rare and common species, as this information allows us to make better informed conservation decisions.

8:30   023.203   N   **Vegetation survey of the Yegua Knobbs Preserve, Bastrop and Lee Counties, Texas**, *Diana K. Digges, Texas State University; David E. Lemke, Texas State University*
The Yegua Knobbs Preserve (YKP) is a private, 122-hectare tract owned and managed by the Pines and Prairies Land Trust and is situated on the Bastrop-Lee County line in the Oak Woods and Prairies ecoregion of east-central Texas. The purpose of this study was to catalog the flora during an entire growing season, collect quantitative data on the composition of the woody and herbaceous communities, and categorize the plant communities that occur at YKP. Three major plant community types have been documented on the site: a post oak-blackjack oak association, a loblolly pine-oak association, and a little bluestem-paspalum association. Botanically, the site is particularly interesting in that it seems to represent the westernmost distribution limit for a number of east Texas species.

025. Biomedical Sciences Oral Session and Section Meeting
10:30 am to 12:30 pm
Bush Mathematics Building, Room 130
Biomedical Sciences
    Biomedical Sciences Oral Session and Section Meeting
Participants:

10:30   025.204   N   **A review of Taxonomic Changes to the Texas Coralsnake, *Micrurus tener*, with a Previously Unreported Aspect of a Recent Bite**, *James Learned Christiansen, University of Texas, Austin; Travis LaDuc, University of Texas, Austin*
The Texas Coralsnake, *Micrurus tener*, was considered a subspecies of the Eastern Coralsnake, *M. fulvius*, until 1991 when it was elevated to specific rank on the basis of allopatric distribution and morphological evidence. Since that time the range has been expanded as genetic work and morphological reevaluation have shown other taxonomic entities to be conspecific with *M. tener*. A recent mild, single fang, short duration bite suggested a previously unreported potential additional threat from envenomation from long duration bites from large specimens of this species. This observation potentially expands the variation in venoms among individual *M. tener*. We present a case history of this bite detailing timing of events as they developed post bite.

10:45 025.205   U   **LIX is an infection-responsive gene in *Amblyomma americanum***, *Gloria Marie Romero, Stephen F. Austin State University; Lindsay M Porter, Stephen F. Austin State University*
Amblyomma americanum, known as the lone star tick, represents a threat to public health due to its role as a vector of bacterial pathogens. For this species, very little is known about the genes involved in mounting an immune response during bacterial infection, however the LIX gene was previously identified in our lab as expressed in response to lipopolysaccharide (LPS). Interestingly, this gene is described in other organisms as an LPS-induced chemokine that serves to attract other immune cells. In this study, we investigated temporal expression of the LIX gene by PCR in both gram-negative and gram-positive infections. Both male and female ticks were assessed both before and at various time points during infection. We found that this gene is only expressed after infection but is present in both gram-negative and gram-positive infections and expression was not sex-specific. BLASTX screening indicates that this gene is highly conserved (up to >82%) across a wide range of taxa. Future directions include RNAi silencing to further validate a role for this gene in tick immune response.

11:00 025.206   U   **Temporal gene expression analysis in *Amblyomma americanum***, *Sylvia Schepps, Stephen F. Austin; Lindsay M Porter, Stephen F. Austin State University*
Amblyomma americanum is a vector of several bacterial pathogens including *Ehrlichia ewingii*, *Ehrlichia chaffeensis* and *Francisella tularensis*. Almost nothing about the lone star tick immune system has been characterized. In this study, we investigated a gene belonging to the CUB domain-containing protein family. Homologs of this gene in other organisms have been characterized as involved in cell-mediated immunity. Expression of this gene before tick bacterial infection and at several time points following infection was analyzed in both male and female ticks. Results indicate that transcripts for this gene are present before and during both Gram – and Gram + infections, although expression appears stronger later in infection. Expression between males and females does not appear to differ. Additional studies, including RNAi, are necessary to further support an immune-related role for this gene in the lone star tick.

11:15 025.207   U   **RNAi silencing of a putative immune gene in the lone star tick**, *Bailey Vogel, Stephen F. Austin State University; Lindsay M Porter, Stephen F. Austin State University*
Amblyomma americanum, or the lone star tick, is widely distributed throughout the nation, however, they are most common in the southern United States. A. americanum transmits a number of pathogens that cause diseases including ehrlichiosis, tularemia, and southern tick-associated rash illness (STARI). Although this tick vectors several different bacterial species, little is known about how it responds immunologically to bacterial infection. A small putative lipoprotein, SmILi, (small immune-related lipoprotein) was identified as expressed in A. americanum after lipopolysaccharide exposure, suggesting a possible role in Gram negative bacterial infection response. In this study, we investigated the effects of silencing on the immune response of the lone star tick by screening immune cell response to infection and tick control of infection load in hemolymph. An improved understanding of the tick immune response to bacteria may lead to novel control methods that can reduce the incidence of tick-borne disease.

11:30 025.208   U   **The Lethal Effects of CimeXa and Drione on *Amblyomma americanum* (lone star tick) Populations**, *Abigail Rosa Garcia, Student; Allan Showler, USDA-ARS KBUSLIRL; Ryan Caesar, Schriener University*
The lone star tick, *Amblyomma americanum*, is the most commonly reported species to bite humans in the southern United States, and transmits diseases such as ehrlichiosis, tularemia, and protozoan infections. Control methods include the use of pesticides and insecticide treatment of wild game and non-game populations. While effective, these methods can attribute to insecticide and pesticide resistance in the future and cause harm towards non-targeted insect species. The use of non-toxic methods would avoid pesticide resistance and mortality towards non-targeted species. CimeXa is a non-toxic insecticidal dust used to control tick populations and has previously been used to control bed bugs; it is composed of fine silica gel particles that destroys the exoskeleton of ticks causing dehydration. In this protocol CimeXa will be compared to the effects of Drione when applied in multiple forms. Drione is a mixture of CimeXa and synthesized natural pyrethrum, an organic neurotoxin that has negative effects on non-targeted arthropods. The aim of this research is to observe and compare the effects of these two substances on controlling tick populations and their effects on non-targeted insects.

026. Cell and Molecular Biology Oral Session 2 and Section Meeting
10:30 am to 12:30 pm
Bush Mathematics Building, Room 101
Cell and Molecular Biology
    Cell and Molecular Biology Oral Session 2 and Section Meeting
Participants:

10:30 026.209   U   **Species identification of an invasive leatherleaf slug using degenerate primers of the mitochondrial CO1 gene**, *Alison Schofield, The*

University of Texas Rio Grande Valley; Norman Barr, United States Department of Agriculture; Kathryn Perez, University of Texas Rio Grande Valley
Veronicellidae, an invasive family of slugs, are pests from tropical and sub-tropical regions that threaten crops throughout the world. Species-level identification of this group is difficult due to their ambiguous phenotypic characteristics. Amplification of the mitochondrial cytochrome oxidase 1 (CO1) gene with universal CO1 primers have previously demonstrated low rates of success in many species. To establish a universal protocol for consistent molecular identification of this group, we attempted to obtain mitochondrial genomes through DNA extraction, PCR analysis, and sequencing. The sequenced genomes were used to design a degenerate set of primers. These primers are currently being tested on Veronicellids across the family, such as *Veronicella* aff. *floridana* and *Veronicella sloanii*. The degenerate primers have amplified the CO1 gene of individuals for which universal primers were unsuccessful. Subsequent steps will include designing and testing additional sets of primers as well as developing CO1 DNA barcodes of an extensive range of samples.

10:45   026.210   U   **Mitochondrial ATP synthesis and the HIPPO pathway coordinately regulate organ growth**, *Logan Robert McDowell, SHSU; Anne Princess Mones, SHSU; Mardelle Atkins, SHSU Assistant Professor*
The Hippo signaling pathway is a vital regulator of organ growth in mammals and other organisms. In developmental biology, the pathway is responsible for dictating either cellular proliferation or programmed cell death. In recent years the HIPPO pathway has become increasingly important for its possible applications in cancer research. Cancerous tumors are generally characterized as tissue experiencing unregulated growth, and often driven by malfunctions of the HIPPO pathway. In the fruit fly *Drosophila melanogaster*, the HIPPO pathway is highly conserved. This has wide ranging implications for research considering 60% of the fruit fly genome is shared with human homologues. Our work at SHSU is capitalizing on these similarities to find relevant interactions with the Hippo pathway in advancing cancer research and our understanding of development. We are currently interested in the effects of *bellwether (blw)* RNAi knockdown, coupled with knockdown of the Hippo effector *scalloped (sd)* in the eye. Blw is a component of the final enzyme complex in the oxidative phosphorylation pathway, and as such is directly responsible for ATP production. When *sd* alone is knocked down the eye functions as normal and retains its original size. When *blw* alone is knocked down the eye loses some size but it is not significant, however; when both *sd* and *blw* are knocked down in unison, the

eye size is greatly reduced. The purpose of this study is to characterize this synergistic phenotype and understand the relationship between energy homeostasis and the Hippo pathway.

027. Chemistry and Biochemistry Oral Session 3 and Section Meeting
10:30 am to 12:30 pm
Miller Science Building, Room 234
Chemistry and Biochemistry
    Chemistry and Biochemistry Oral Session 3 and Section Meeting
Participants:

10:30   027.211   U   **RecA Binds Weakly to Codons That, When Mutated, Lend Isoniazid and Rifampin Resistance in Tuberculosis**, *Ellen Ann Hamzy, Wayland Baptist University*
Drug resistance for several therapies used to treat Mycobacterium tuberculosis (Mtb) often develops from a single nucleotide polymorphisms. While the Mycobacterium's genome is stable and rarely mutates spontaneously, mutation becomes more frequent during treatment for tuberculosis. The protein RecA has a role in DNA repair which may occur, for example, after drug treatment. To investigate how RecA could be involved with Mtb's development of drug resistance, its relative binding strengths to oligonucleotides containing common mutation sites found in drug-resistant strains of the bacterium were evaluated using electrophoretic mobility shift assays. RecA bound more tightly to oligonucleotides containing sequences found preceding and following the mutation site compared to oligonucleotides containing the region centered on the mutation site. The weak binding shown by RecA to the codon of interest may indicate that the protein has a higher tolerance for mismatches at that location, suggesting that drug resistance may arise during DNA repair by RecA of damage that occurs as a consequence of treatment.

10:45   027.212   G   **Small Molecule Inhibitor of FOXC2 as a Modulator of Epithelial-Mesenchymal Transition in Cancer**, *Weston Alan Manuel, The University of Texas at Tyler; Jiyong Lee, The University of Texas at Tyler*
The aberrant activation of the epithelial-mesenchymal transition (EMT) causes epithelial cancer cells to acquire a mesenchymal phenotype leading to the generation of metastatic cancer cells. Recent studies have identified forkhead box C2 (FOXC2) as a central mediator of EMT and shown that its function is necessary to initiate and maintain mesenchymal phenotype, suggesting that FOXC2 can serve as a therapeutic target to attenuate cancer metastasis. In fact, reduction of FOXC2 expression by RNAi or inhibition of upstream regulators of FOXC2 has been reported effective in inhibiting tumor metastasis. Therefore, a

small molecule inhibitor of FOXC2 can serve as a chemical probe to study EMT as well as become a novel anti-cancer therapeutic targeting cancer metastasis. We have identified the first small molecule inhibitors of FOXC2 via a one-bead-one-compound (OBOC) combinatorial chemical library screening. In vitro experiments have revealed that one of the hit compounds, MC-1-F2, reverses EMT in breast cell lines with high levels of FOXC2 expression; inhibiting migratory, invasive and proliferative capabilities of these cells. We have also found that MC-1-F2 reverses EMT in castration-resistant prostate cancer cells suggesting its therapeutic potential in targeting therapy-resistant prostate cancer.

11:00 027.213 G **Structural Analysis of Mouse Leukotriene B4 ω-Hydroxylase Cyp4f14**, *Madri M Jayakody, Sam Houston State University; Donovan C Haines, Sam Houston State University*
Leukotriene B4 ω-hydroxylase suppresses neuroinflammation through its metabolism of the pro-inflammatory mediator Leukotriene B4 (LTB4) in humans. Mouse gene cyp4f14 is a membrane bound enzyme with a sequence identity of 80% to both human genes CYP4F2 and CYP4F3. These two genes are responsible for producing Leukotriene B4 ω-hydroxylase in humans. Analysis of sequence alignments and preliminary work with homology models yielded insights into how mouse LTB4 hydroxylase interacts with its substrate. Structural analysis of the active site was carried out by aligning the 524 amino acid i-TASSER-generated model of the cyp4f14 enzyme with the widely studied model P450 enzyme P450BM-3 using PyMOL software. These studies enabled us to identify the secondary structures of cyp4f14 and the position of active site amino acids. Molecular docking studies revealed the possible binding sites for substrates such as LTB4, pNCA and 20-HETE. It is hoped that these results will provide insights into enzyme substrate interactions and form a basis for future research.

11:15 027.214 U **Synthesis and Characterization of Dangling Ligand Tin Compounds Containing O-methoxymethyl-phenyl groups, e.g. (MeOCH2C6H4)2SnBr2**, *Henk Steven van den Bogaard, The University of Texas at El Paso; Hemant K Sharma, The University of Texas at El Paso; Alejandro Metta-Magana, The University of Texas at El Paso; Keith H Pannell, The University of Texas at El Paso*
As noted in the literature, organotin compounds (OTs) containing a short carbon chain with a donor atom (N, O, S) at the end form intramolecular chelate rings with the Lewis acidic tin center. These intramolecular donor-tin secondary bonds modify the biological activity of the OTs and we recently demonstrated the

interaction of a sulfur ligand to tin in bis-(3-methylthiopropyl)tin dichloride, dramatically reduces the inhibition of human natural killer cells when compared to the dibutyltin analog, Bu2SnCl2. In attempts to expand the family of these potentially interesting bioactive materials we have reacted the Grignard reagent MeOCH2C6H4-MgBr (ArylMgBr) with SnCl4 and obtained a series on new compounds, Ar2SnBr2 (1), [Ar2SnBr]2O (2), and Ar3SnSnAr3 (3). Single crystal X-ray diffraction reveals strong O-Sn secondary bonds for 1 and 2, 2.455(5) Å and 2.540(6) Å for 1 and 2.465(4) Å and 2.523(5) Å in 2, all significantly less than the sum of their van der Waals radii of 3.69 Å. For 3 no intramolecular interaction is observed; each oxygen is equivalent in the molecule exhibiting a distance of 4.185 Å to the adjacent tin and 5.293 Å from the neighboring tin of each oxygen. It is noteworthy that the "expected" chloro derivatives transform to the bromo materials during our specific reaction conditions. The 119Sn NMR of 1 exhibits a resonance at -150 ppm which compares to -81.8 ppm for the diphenyl analog, Ph2SnBr2 suggesting the solid state structure persists in solution. Complete experimental, structural, and spectral data will be presented.

11:30 027.215 U **Synthesis of a Tert-butyl Diazaborole-linked Macrocycle using Le Chatelier's Principle**, *Ian Haltom, Sam Houston State University; Dustin E Gross, Sam Houston State University*
Diazaborole-linked materials have recently been of significant interest in our research group due to their potential applications in gas storage, light-emitting diode technology, and chemical sensing. Since diazaborole formation is a reversible process, we have taken advantage of Le Chatelier's principle to remove side products and achieve a high conversion to diazaborole-linked materials. In addition, previously synthesized diazaborole-linked macrocycles have exhibited limited solubility, preventing their characterization in common organic solvents. The synthesis of new diazaborole-linked materials with large, sterically-hindering tert-butyl groups has helped to reduce these solubility concerns, as well as allowing more thorough characterization of diazaborole formation by NMR spectroscopy. Further insights into the effectiveness of physically removing side products opon diazaborole conversion will be discussed.

028. Freshwater Science Oral Session 2 and Section Meeting
10:30 am to 12:30 pm
Miller Science Building, Room 137
Freshwater Science
   Freshwater Science Oral Session 2 and Section Meeting
Participants:
10:30 028.216 G **Northern Leon Creek Greenway**

user and fish population surveys to enhance urban fishing, *Madeliene Alexandria Buchanan, University of Texas at San Antonio; Jeffrey T Hutchinson, University of Texas at San Antonio; Randall Myers, Texas Parks and Wildlife, Inland Fisheries Division, San Antonio, TX*

The Leon Creek Greenway in San Antonio, Texas is an ephemeral creek that receives ground and surface water runoff from northwestern Bexar County. Five ponds exist along the greenway ranging from 0.12 to 0.89 ha in size and occur within 1.6 km between UTSA Boulevard and Prue Road. Earl Scott pond is managed by Texas Parks and Wildlife Department (TPWD) as a community fishing lake and is stocked with rainbow trout (*Oncorhynchus mykiss*) and channel catfish (*Ictalurus punctatus*). Observations of the other four unnamed water bodies indicate the ponds receive some degree of fishing pressure, but these ponds are not normally stocked. Fish populations of the five identified ponds along 5.1 km of the northern Leon Creek Greenway were surveyed with backpack and boat electroshocking, and seining equipment. The surveys were performed in May 2019 and October 2019. All captured fish were identified, measured to the nearest mm, and released. Fish measuring over 100 mm during the May collection were marked by fin clipping and noted as a recapture during the October collection. To evaluate users along the Greenway, a 12-month survey was conducted from January 2019 to December 2019. These surveys occurred 4 times per month at random times and locations along the designated 5.1 kilometers of trail. Users on the trail were then counted and their activities were recorded. The study will end January 2020. Statistical analysis on fish population estimates and Greenway user demographics will provide TPWD with information to improve fishing along the Leon Creek Greenway.

10:45 028.217 G **Water quality assessment of the Neches River Watershed above Lake Palestine**, *Samantha Jean Rowe, The University of Texas at Tyler*
Several waterways have been flagged in East Texas as being bacterially impaired, including portions of the upper Neches River. Water quality is important to support healthy aquatic ecosystems as well as the well-being of inhabitants near or downstream of the body of water. Many factors can contribute to the water quality of rivers, such as agriculture, recreational use, as well as urban and industrial growth. This study looks at the water quality of specific branches in the Upper Neches River including the Neches River above Lake Palestine and Black Fork Creek. All sample sites were visited during the months of April, May, June, and July 2019. Water quality assessments were performed including tests of bacterial impairment, dissolved oxygen, as well as various other water chemistry parameters. Fish and macroinvertebrate assays were also completed. Fish assays included anesthetizing and fixing with formalin. Any deformed or compromised fish were also fixed and brought back to the UT-Tyler campus. The data will be used to calculate water quality indices (IBI, B-IBI). Asian Clams, *Corbicula fluminea*, collected during the macroinvertebrate assays will be used to obtain *Escherichia coli*. The *E. coli* will be sequenced and analyzed to obtain strain variation. These data may be combined with hydrological and stream habitat information to perform a TMDL analysis of the Upper Neches River watershed.

029. Geosciences Oral Session and Section Meeting
10:30 am to 12:30 pm
Miller Science Building, Room 139
Geosciences
  Geosciences Oral Session and Section Meeting
Participants:

10:30 029.218 N **Development of Tool Marks on the Beach Face in Sea Rim State Park, Texas**, *Russell LaRell Nielson, Stephen F. Austin State University*
Well-developed tool marks are present on the beach in Sea Rim State Park, Texas. Tool marks are divided into three different types: stationary tool marks, obstacle tool marks, and moving tool marks. Stationary tool marks are produced by currents flowing around wood, mud pebbles, shells and stationary objects. Obstacle tool marks develop where shells and mud pebbles lie in the path of a down slope current or tidal currents producing ridges of sand. Moving tool marks are produced by obstacles bouncing or sliding along a surface. Two zones of tool marks are recognized in Sea Rim State Park. One is, a lower zone dominated by tidal and longshore processes operating on the berm and lower backshore generating obstacle and moving tool marks. These marks develop on the down currents side of bivalve and gastropod shells, and pebble clasts. The upper zone consists of the upper backshore and dunes where wind and flood surges are the dominate processes. In this zone stationary tool marks are produced by wind and flood surges flowing around wood, vegetation, shells and any stationary objects. Preservation of tool marks in the rock record is not common because of the high energy of the beach environment destroying the marks during the next tidal cycle or storm.

10:45 029.219 U **Geochemical and Petrographic Analysis of Chert: Parameters for Fracture Analysis**, *Joshua Wynn, Wayland Baptist University; Tim Walsh, Wayland Baptist University*
Fourier Transform Infrared (FTIR) analyses were performed on cherts to obtain crystallinity indices as part of an ongoing fracture mechanics study that began in 2017. Chert crystallinity indices were derived as structural parameters that will be utilized in the ongoing

larger project aiming to develop a comprehensive model of chert failure at the microscale. Potassium-bromide pellets of nine different cherts types and two crystalline quartz standards were analyzed using FTIR. Infrared spectra in the region 400-4000 cm-1 were obtained from all pellets. Following after Saikia, ratios were calculated from the intensity of peaks associated with 778 cm-1 and 695 cm-1. These ratios represented indices of crystallinity, the degree of structural order, in each chert samples. High indices were indicative of low structural order. Averages along with standard deviations were calculated from crystallinity data. The lowest crystallinity indices were observed in Arkansas Novaculite (ARKN, $\overline{x}$=2.35 ± 0.08, n=60) and Burlington-Keokuk (BURL, $\overline{x}$=2.51 ± 0.10, n=60) samples. The highest crystallinity indices were observed in Knife River Flint ($\overline{x}$=3.45 ± 0.12, n=54) and Flint River Swirl ($\overline{x}$=3.76 ± 0.22, n=54) samples. Following the FTIR analyses, ARKN, BURL, and Bigfork chert types were analyzed using a petrographic microscope, scanning electron microscopy (SEM), x-ray diffraction (XRD), and inductively coupled plasma mass spectrometry (ICP-MS). Petrographic and ICP-MS data were used to isolate representative samples of each chert type. Representative samples were then analyzed using XRD and SEM. Structural parameters derived from these data will help build and test fracture models currently being developed by the researcher.

11:00   029.220   G   **Potential sediment source areas of the northeastern Española Basin in north-central New Mexico using major and trace element geochemistry**, *Garrett Ross Williamson, Texas Tech Univeristy; Dustin Sweet, Texas Tech Univeristy*
The Española Basin is a continental rift basin within the Rio Grande Rift located in north-central New Mexico bordered by the Jemez and Sangre de Cristo Mountains. This study concentrates on the Pojoaque Member of the Tesuque Formation near Española, NM. During the Miocene, this area was part of gently sloping plains directly west of the Sangre de Cristos. Immediately to the northeast was the Peñasco Embayment, a broad shallow embayment reaching far to the east of this locale. Previous authors designated two paleodrainage systems based on petrographic, lithologic, and paleocurrent analyses of coarse clastics south of the study area resulting in the identification of two lithosomes: A and B. Lithosome A's source area was attributed to Precambrian-core Santa Fe block of the Sangre de Cristo Mountains, while contributions of lithosome B sediments came from the Latir volcanic fields to the northeast. The goal of this study was to evaluate the potential of using major and trace element geochemistry (XRF and LA-ICP-MS) for provenance determination of mudrocks within the Española Basin to either confirm the existing depositional environment interpretation or provide an alternate explanation. Eight samples were tested; three from lithosome A and five from lithosome B. Trace element analyses indicate the samples have an upper continental crust or felsic provenance. Major element analyses interpret the samples to having a granite to quartzose sedimentary provenance with two beds from lithosome B plotting more intermediate. The initial analysis appears to suggest that the geochemistry can be used to interpret sedimentary provenance.

11:15   029.221   G   **Insights to Provenance of Paleozoic Shales from the Midland Basin Using Major and Trace Elements**, *Hunter Green, Texas Tech University*
Geochemical studies within the Permian Basin have been conducted on shales for reservoir characterization and paleoredox conditions, with little interests on sediment origins and provenance. Furthermore, these studies have largely been limited to coarse grained lithologies using detrital mineral age dating. Therefore, an opportunity exists to derive a geochemical signature of potential source areas through trace elements from clay minerals. Samples from three distinct Paleozoic shales were collected from cores within the Midland Basin for trace elements analysis via laser ablation ICP-MS. REE concentrations were normalized to chondrite and show elevated LREE (La/Tb = 46.84 – 62.81), negative Eu anomaly (Eu/Eu* = 0.17 – 0.24), and relatively low HREE (Tb/Lu 1.12 – 1.94). Additionally, trace element were normalized to primitive mantle and show crustal contamination of the magmatic system in its juvenile phase. Based on normalization plots, the original source rocks for all samples can be characterized as having a primarily felsic composition and formed within a supra subduction zone. Differentiation of trace element concentrations over time suggests different source areas or source area evolution between Mississippian to Permian time. Moreover, major trace elements fall within the fields of felsic igneous provenance, supporting same areas of provenance as suggested by REE. The creation of a distinct geochemical signature from clay minerals derived from crystalline sources can provide better constrains on potential sediment sources for the Midland Basin. These data in conjunction with detrital mineral age dating will provide a more robust and improved understanding of Midland Basin provenance and sediment dispersal pathways.

11:30   029.222   U   **Lamniform and Carcharhiniform sharks of the Weches Formation, Nacogdoches County, Texas**, *Jessica Lauren O'Neall, Stephen F. Austin State University; R. LaRell Nielson, Stephen F. Austin State University; Michael Read, Stephen F. Austin State University*
A paleontological study was conducted to determine which shark genera are present in the middle Eocene of

the Weches Formation in Nacogdoches County, Texas. Study material consists of fourteen previously collected shark teeth and ten recently collected teeth recovered from outcrops along Maroney Drive and the southernmost portion of Lake Nacogdoches. Morphological features of importance included serrations, cusplets, striations on the lingual side of the crown, cutting edges, and relative proportions of the root and crown. Teeth were identified to the genus level based on comparisions with previously described and illustrated Eocene selachian faunas. As a result, five genera of lamniform and carcharhiniform sharks were recognized, including Striatolamia, Carcharias, Brachycarcharias, Carcharhinus, and Galeorhinus. A diverse middle Eocene shark fauna appears to be represented by these teeth, given the relatively high number of genera represented within the relatively small sample size.

11:45   029.223   G   **Paleontologic and Stratigraphic Analysis of the Harrisburg Member of the Kaibab Formation in North Central Arizona**, *Zachery Ted Case, Stephen F. Austin State University; R. LaRell Nielson, Stephen F. Austin State University*
In the upper stratigraphic units of the Harrisburg Member of the Kaibab Formation on the north Kaibab Plateau in north central Arizona, a silicified faunal assemblage of nautiloids, ammonites, gastropods, brachiopods, bivalves, and trilobites are present. At some locations intense bioturbation has occurred. Stratigraphic analysis of the Harrisburg Member contains 9 stratigraphic units. The contact between the Fossil Mountain Member and the Harrisburg Member is noted by a change from a thick-bedded fossiliferous dolostone, to a thin-bedded dolostone of unit 1. Unit 2 is a thin-bedded dolostone. A sandstone containing well-rounded quarts grains makes up unit 3. The upper contact of unit 3 is marked by a weathered surface and represents a disconformity suggesting subaerial exposure. A red siltstone makes up unit 4. A fossiliferous dolostone with a white siliceous cap makes up unit 5. Above the fossiliferous dolostone is a covered slope representing unit 6. Unit 7 is a thin-bedded fossiliferous dolostone that contains silicified nautiloids, ammonites, and brachiopods along with burrows. Unit 8 is a covered slope. Unit 9 is the uppermost unit and contains a fossiliferous dolostone with silicified fossils. Above the Harrisburg Member is a disconformity filled by the Rock Canyon Conglomerate and Triassic Moenkopi Formation. Deposition of the lower part of the Harrisburg Member occurred on a marine shelf during a regression representing the end of the lower Kaibab sequence. Units five through nine were deposited during a transgression, on a low energy marine shelf representing a second transgression and a younger sequence.

12:00   029.224   G   **Synthesis of paleoclimate, paleoecological, and archaeological data for central Texas over the last 20,000 years**, *Stacie Skwarcan, University of Texas at Austin*
The Edwards Plateau in central Texas has been the subject of extensive paleoclimatic, paleoecological, and archaeological investigation since the mid-twentieth century, with the efforts of this work yielding over 700 publications. I am completing a compilation and synthesis of paleoclimate data relevant to the entire state of Texas and of paleoecological and archaeological data from the Edwards and Stockton plateaus that will provide a synthesis of the work that has been done regarding the climate, ecology, and human presence on the Edwards Plateau over the past 20,000 years. This type of compilation will aid in the identification of spatial or temporal gaps in knowledge where future work can be focused to answer questions including how humans, plants, and animals responded to past changes in climate from the late Pleistocene through the Holocene. Additionally, sites on the Edwards Plateau are uniquely positioned to record evidence of longitudinal shifts in the biogeographic and climatic boundary historically associated with the 100th Meridian, which has historically been recognized as a dividing line between the drier western United States and wetter eastern United States. If recent evidence of an eastward shift in that boundary is valid, and if an eastward shift continues, it may cause large population centers currently to the east of the boundary (e.g., Austin and San Antonio) to become more water-stressed. Determining whether and/or how this boundary has shifted in the past has the potential to aid in planning for future management challenges of water and other natural resources.

12:15   029.225   G   **The History of the Nacogdoches Oil Field**, *Hannah Chambers, Stephen F. Austin State University*
Although a lesser known oil field, the rich history of the Nacogdoches Oil Field spans more than a century. The first oil discovery in this field was likely made by the local Native Americans who found oil in pools near present-day Oil Springs, Texas. There were various uses for the oil including medicinal applications and water proofing of canoes. In 1866, Lyne T. Barret (1832-1913) with the Melrose Petroleum Oil Company completed the first successful oil well in the Nacogdoches Oil Field. This discovery is most significant because it was also the first successful oil well drilled in the state of Texas. Due to the unrest brought on by reconstruction that followed the Civil War, nearly two decades would pass before the Nacogdoches Oil Field would see any substantial development. By the late 1880's prospectors and small petroleum companies began operations which led to an influx of production in the following years. As other,

more productive, oil fields were developed in the early 1900's, production in the Nacogdoches Oil Field began to decline. By the early 1950's, operators returned to the area and began producing primarily gas. As of August 2019 more than 1,000 wells have been drilled in the Nacogdoches Oil Field.

030. Terrestrial Ecology & Management Oral Session and Section Meeting

10:30 am to 12:30 pm
Miller Science Building, Room 233
Terrestrial Ecology and Management
Terrestrial Ecology & Management Oral Session and Section Meeting
Participants:

10:30 030.226 N **Arachnids of the Northern Chihuahuan Desert**, *Christopher Ritzi, Sul Ross State University*
Arachnids tend to be an overlooked facet of animal biodiversity in the world around us. This is no different in the northern Chihuahan desert, where we find an amazingly diverse and successful taxonomic group despite the formidable hot and dry conditions. In order to get a better appreciation of the Arachnida diversity present in the Chihuahan desert region, a summer field class was conducted by Sul Ross State University to investigate and collect an assortment of the arachnids present. From these collections, specimens were collected from the following orders: Acari, Amblypygi, Araneae, Opiliones, Pseudoscorpiones, Scorpiones, Sulifugae, and Uropygi, thus representing all but three of the known arachnid orders. Common methods for the collection and recovery of these arthropods included hand collecting, traps, Burlese funnels, ectoparasitic removals from hosts, blacklight flashlight surveys, and nighttime inspection of various habitats, including riparian areas and rock cuts. The variety of arachnids recovered will be discussed, including basic information about their natural history. In addition, the variety of families recovered from certain orders will be expanded upon, illustrating the need for more survey work to better document the arachnid diversity in the region.

10:45 030.227 U **Comparisons of scarab and cerambycid beetle diversity before and after a rare, hurricane-induced flooding event in southeastern Texas**, *Xander Haynes, Stephen F. Austin State University; Amethyst Michelleanne Haynes, Stephen F. Austin State University; Daniel Bennett, Stephen F. Austin State University*
Extreme flooding events are expected to occur more frequently in many regions of the world due to climate change. Insight into how organisms may be impacted by increased flooding can be gained by examining the effects of recent storms on organisms in natural areas. The Big Thicket National Preserve in southeastern

Texas was highly impacted by flooding caused by Hurricane Harvey in late summer 2017. Prior to the storm, a Malaise trap was established in the preserve in February 2017 to sample insects in a sandhill habitat within a longleaf pine savanna. This trap operated continuously and was serviced roughly twice a month until it was destroyed by hurricane-induced floodwaters in late August. Another trap was deployed to the same site in February 2019 so that before and after storm comparisons of the terrestrial insect fauna could be made. We hypothesized that ground dwelling insects suffered a decline after the storm relative to above ground dwelling insects and sought evidence of impacts on two families of beetles: (1) Scarabaeidae, a ground dwelling group in the larval stage; and (2) Cerambycidae, a wood dwelling group in the larval stage. Data are presented that address this hypothesis, and the effects of Hurricane Harvey's impact on this site are discussed.

11:00 030.228 G **Pan trap survey of bee flies (Diptera: Bombyliidae) using novel methodology exploiting color and dark spot attraction behavior**, *Lauren G. Garrett, Sul Ross State Univeristy; Christopher Ritzi, Sul Ross State University*
This study was conducted to determine the prevalence and diversity of bee flies (Diptera: Bombyliidae), a parasitoid and pollinator family of flies, within Brewster and Jeff Davis counties. A novel pan trapping method was designed to exploit color and dark spotting attraction as an attempt to maximize collection. Traps were deployed between late-March and early-November 2018 within three distinct desert communities: Terlingua Ranch (desert scrub), Chihuahuan Desert Research Institute (grasslands), and the Davis Mountains Preserve (sky island). Representatives of subfamilies Anthracinae, Bombyliinae, Phthiriinae, and Usiinae were captured. A Kruskal-Wallis test showed pan trap collection differed in total bee fly pan trap collection by community ($H = 35.754$, $p < 0.001$) and pan trap treatment ($H = 19.617$, $p < 0.001$), and additionally by subfamily: Anthracinae by pan trap treatment ($H = 27.709$, $p < 0.001$), Phthiriinae by community ($H = 52.473$, $p < 0.001$) and pan trap treatment ($H = 86.050$, $p < 0.001$), and Usiinae by community ($H = 16.024$, $p < 0.001$). Neither community nor pan trap treatment were statistically significant for Bombyliinae. Further post hoc analysis will be discussed.

11:15 030.229 U **Home range and habitat associations from telemetry of Texas horned lizards (*Phrynosoma cornutum*) in the Southern High Plains of Texas**, *Sarah A. Macha, Wayland Baptist University; Andrew C. Kasner, Wayland Baptist University*
Area searches were conducted May-Oct 2019 for a continuing capture-mark-recapture study of Texas

horned lizards (*Phrynosoma cornutum*) at Running Water Conservancy, Hale County, Texas. Morphological and habitat data were collected at lizard locations, and lizards >40mm SVL were marked with a PIT tag for future individual identification. Additionally, 14 adult lizards (11 females, 3 males, mass >15g) were marked with a VHF radio transmitter to determine home range and habitat use. A total of 277 lizard captures (198 unique individuals [114 PIT tagged] + 79 recaptures) were documented: 41 adults (30 tagged in 2019, 11 recaptures from 2018); 92 juveniles (84 tagged in 2019, 8 recaptured from 2018); and 65 hatchlings (not tagged). The average home range for all lizards was 495 sq. m (range = 46-2043). Average home range was 616 sq. m (range = 92-2043) for female lizards and 257 sq. m (range = 46-554) for male lizards. Male home ranges did not overlap those of other males. All female home ranges except one overlapped those of other females (average overlap = 99 sq. m). Two of the three male home ranges overlapped with two females each (average overlap = 35 sq. m), while one male did not overlap with any females. This male's home range, however, was also very small (46 sq. m) compared to the other males (170 sq. m and 554 sq. m). Radio-marked lizards used all available habitat types at the site, including shortgrass prairie grassland within a wetland conservation reserve and adjoining disturbed prairie.

11:30 030.230 U **Influence of Incubation Moisture on the Morphology and Behavior of Neonate Corn Snakes, (*Pantherophis guttatus*)**, *Oluwatoni Bami-Ogunbiyi, University of Texas at Tyler; Neil Ford, UT Tyler Biology*
It is known that incubation moisture levels of the eggs affect the survival and morphology of hatchling Australian Common Keelback snake (*Tropidonophis mairii*). That study showed that the water potential of the nest significantly influences many phenotypic traits of hatchling keelbacks, notably the body size. It was hypothesized the larger hatchlings are more likely to survive. We experimentally tested three moisture levels (50%, 100%, and 200% water mass to vermiculite) on the characteristics of hatchling corn snakes, *Pantherophis guttatus*. Nine eggs were obtained from each of 8 female corn snakes, and distributed evenly (3 in each level from each female) among the moisture levels. Incubation containers were maintained at 28 C. After hatching the percentage mortality, the number of days it took for the eggs to hatch, and the length and mass of the neonates were recorded. Hatchling aggression was tested by counting strikes at a face painted on rubber ball. We observed that the mortality rate of the eggs was significantly higher in the lower concentration than the higher two water concentrations. It was evident that some eggs desiccated in the 50% moisture level. Eggs took significantly longer to hatch

in the 50% moisture level. Neonates were not different in either length or mass. No aggressive behavior occurred in any of the groups. These results contrast somewhat from previous work on an Australian egg-laying species.

11:45 030.231 N **Bird Diversity in Urban San Antonio: A Look into the Benefits of Native Plant Landscaping**, *Carli Renae Martinez, University of the Incarnate Word*
Although Texas currently holds the second highest bird richness in the United States, urbanization of its major cities threatens levels of bird diversity. San Antonio has grown particularly rapid over the past 40 years, resulting in decreasing natural habitat. A major concern for bird diversity involves the lack of native vegetation within San Antonio's urban landscaping, which naturally supports a wide variety of bird species. This study looks at the benefits of native plants on bird diversity in these areas, hypothesizing that greater native plant diversity correlates with greater bird diversity. This was tested by performing transect surveys over three different urban locations (Settings A, B, and C), each with differing levels of native plant abundance and distribution. Setting A was expected to have the lowest bird diversity and Setting C the highest. The surveys were used to document the abundances of each plant and bird species identified within the settings. Following counts, the Shannon Diversity Index was used to calculate levels of plant and bird diversity for each setting. As expected, Setting C had the highest level of plant and bird diversity. Setting A however, which had the lowest plant diversity, experienced a higher bird diversity than Setting B. This was speculated to be related to other environmental factors, being that Setting A possessed attractive elements that may have outweighed the lack of native vegetation. Further research of these elements should occur to determine whether they are more significant than native plants in influencing bird diversity.

12:00 030.232 U **Molecular based sex identification and sex ratios of wintering sparrows in the Southern High Plains, Texas**, *Elizabeth Reinhart, Wayland Baptist University; Andrew C. Kasner, Wayland Baptist University; Adam J. Reinhart, Wayland Baptist University*
Wintering sparrow species are monomorphic, which makes the identification of sex based on phenotypic characteristics extremely difficult. The purpose of this study was to determine sex ratios of wintering sparrows present in the Southern High Plains of Floyd County, Texas. Feathers were collected from 172 individuals of four sparrow species during bird banding efforts from 5 Jan – 28 Feb 2019 to understand winter ecology and site fidelity. Sparrow species included Savannah Sparrow (n=51; *Passerculus sandwhichensis*), White-

crowned Sparrow (n=23; *Zonotrichia leucophrys*), Lincoln's Sparrow (n=5; *Melospiza lincolnii*), Song Sparrow (n=2; *M. melodia*). Sex was determined through amplification of the *CHD* gene using polymerase chain reaction and electrophoresis, which results in gels with two bands for females (heterozygous) and a single band for males (homozygous). A total of 80 samples have been successfully identified for sex, with 42 males and 38 females overall (male:female ratio = 1.11). The sex ratios for the two most abundant species were 1.56 (14 males:9 females) for Savannah Sparrow and 0.82 (23 males:28 females) for White-crowned Sparrow.

12:15   030.233   N   **Tardigrades of Texas: Austin Fifth Graders add three species to the Texas Biodiversity List**, *Hannah Cotten, Hill Elementary, Austin ISD; William R. Miller, Baker University*
Tardigrades, or Water Bears, are microscopic animals found in terrestrial and aquatic habitats. Because tardigrades can be easily found and yet are understudied, Hill Elementary fifth graders in Austin, Texas collaborated with their teacher and an expert to conduct a biodiversity survey of microscopic animals found in lichens and mosses on their school campus. These ten-year-olds learned to differentiate between tardigrades, rotifers, and nematodes as they collected samples from different habitats. In their first year of study, they found a unique green tardigrade. They consulted an expert and discovered it was actually a species never recorded in Texas. Because the list of Tardigrade Biodiversity in the State of Texas is not a formal, government-maintained report, it is reliant on the accumulation of data from published scientific papers. Thus, last year, the addition to the list was reported with a poster at the Texas Academy of Science Annual Meeting. In their second year of study, students formed an after-school club known as "The Water Bear Club". They learned how to catch tardigrades and make slides. They sent their slides to an expert to identify the species, and discovered that two additional species were new to the State. This experience demonstrates that students challenged with basic research questions can learn to conduct field research, carry out scientific surveys, collaborate with scientists and discover new knowledge to be shared. In this case, students learned to find tardigrades at an early age, contributing to our overall understanding of this phylum.

033. Graduate Student Oral Presentation Competition
2:00 to 3:40 pm
Kennedy Auditorium, Auditorium
Graduate Student Paper Competition
    Graduate Student Oral Presentation Competition
Participants:

2:00   033.234   G   **Big jumps or little steps: Fighting gerrymandering with random walks**, *Shawn Michel-*

Alexander Brody, Tarleton State University
Courts at all levels are struggling with the increasingly pressing and complex issue of political gerrymandering. Deadlines for the post-2020 census redistricting are quickly approaching. At the heart of our difficulties to fairly divide ourselves in voting district lies a math problem – how do we measure fairness? How can we use that measure to draw fair district boundaries? Our project is part of nationwide collaboration of mathematicians, demographers, lawyers, mapmakers, political leaders, and citizens attempting to develop tools for this purpose. We will survey Markov Chain Monte Carlo (MCMC) methods used successfully in the PA Supreme Court case, work to make MCMC more widely available via the Python package GerryChain, and a recent improvement to MCMC called recombination. We will also discuss several commonly used compactness metrics and present a new idea called transit time compactness that aims to measure cohesiveness of people, not just land.

2:15   033.235   G   **An ex situ evaluation of grasses (Poaceae) for management of roadside runoff in the Edwards Aquifer recharge zone**, *Sarah Gorton, The University of Texas at San Antonio; Jeffrey T Hutchinson, University of Texas at San Antonio; Vikram Kapoor, The University of Texas at San Antonio*
Excess nitrates and phosphates in stormwater runoff along roadways can be detrimental to ecological processes and raise the costs of treating groundwater pumped by water utilities. Given the number of sensitive species present in the Edwards Aquifer, it is important to regulate and remediate potential sources of nitrates and phosphates before they enter the recharge zone. Understanding native plant uptake of nitrates and phosphates can help inform decision-makers about plant selection when revegetating post-construction, particularly along roadsides. In this study, the seeds of 13 native and 2 non-native species of grasses were potted in a commercial purchased potting soil and monitored for germination over two months. Germination percentage and seedling growth rates were monitored weekly. At 2 months, each grass species was harvested, separated by roots and shoots, oven-dried, and analyzed for dry weight biomass, relative growth rate, and root and shoot nitrate and phosphate concentrations. Based on the results of this study, five native grass species will be further evaluated in and ex situ for nitrates, phosphates, and heavy metals during the spring of 2020. This presentation will reflect which native grasses were most efficient in the mean uptake of nitrates and phosphorus from the soils and the ratio of N and P uptake to biomass.

2:30   033.236   G   **Being Nose-y: Investigating the influences of climate and energetics on human nasal anatomy**, *Alexa P. Kelly, University of North Texas*

Health Science Center; Cara Ocobock, University of Notre Dame; Scott D. Maddux, UNT Health Science Center
Narrower nasal airways enhance inspiratory air-conditioning in cold-dry climates. Yet, cold-dry environments are also metabolically expensive, demanding greater oxygen intake than tropical environments. Thus, it has been hypothesized that climate-mediated nasal narrowing may necessitate a compensatory increase in nasal height to ensure the airways remain large enough to transmit a metabolically adequate volume of oxygen. To test this, we collected 17 linear measurements from the nasal skeleton of modern humans from 10 climatically diverse geographic areas (Arctic Circle, Europe, Iran, Australia, North Africa, Khoisan, South African Bantu, East Africa, West Africa, Papua New Guinea). Measurements of associated postcranial elements were then used to estimate body mass and basal metabolic rate (BMR) for each individual. Climatic data were similarly collected for each geographic provenance and employed with morphological data in multivariate analyses. Our results indicate that most measurements of nasal complex breadth are significantly correlated with climate (all r-values >0.45, all p-values <0.009), but not BMR. Conversely, nasal height is more strongly correlated with BMR (r=0.47, p=0.02) than climate. Additionally, nasal passage cross-sectional area demonstrates a positive association with BMR (r=0.74, p=0.0007), while passage cross-sectional shape exhibits a significant relationship with climate (r=0.52, p=0.0017) with taller/narrower airways found in colder-drier environments. Our results support assertions that nasal narrowing in colder climates necessitates a concomitant increase in nasal height to maintain an overall airway size capable of meeting energetic demands for oxygen intake. Future research employing larger, more diverse samples appears poised to provide far-reaching insights regarding climatic adaptation during human evolution.

2:45   033.237   G   **The role of topography and elevation in shaping middle Eocene mammalian diversity in North America**, *Ingrid Lundeen, University of Texas at Austin*
"Fantasia" is a high-elevation (3140 m) Bridgerian (early Middle Eocene) fossil locality found on Carter Mountain on the western edge of the Bighorn Basin in northwestern Wyoming. Carter Mountain is part of the Absaroka Volcanic Province (AVP), which was one of the major eruptive zones during the Eocene, depositing tuffs and volcaniclastic sedimentary rock throughout the Absaroka Range and into adjacent sedimentary basins. The fauna preserved here lived in the AVP when the Thorofare Creek Volcanic group became active, marked by the ~ 48 Ma Blue Point ash bed, which directly overlies the site. The timing of eruptive events in the AVP, as well as ongoing oxygen isotope paleoaltimetry studies in the region, suggest that this site documents a faunal community that lived at a relatively high elevation, compared with well-sampled basin sites. Here I report results of renewed collecting at Fantasia (2017-19), which approximately tripled the known fossil sample. The most common taxa in the sample reported here are rodents (36%), euarchontans (28%) including particularly abundant Microsyops, Hyopsodus (7%), and Orohippus (6%). Additionally, the site preserves multiple presumed ancestor-descendant pairs as well as a unique diversity of some small-bodied clades. Increased sampling of high-elevation sites like Fantasia provides an opportunity to critically examine sampling biases favoring lowland depositional environments in the North American Eocene. The degree to which this bias has impacted our understanding of faunal community change over time is explored here in light of new data from Fantasia.

3:00   033.238   G   **Mitonuclear discordance in North American corn snakes (*Pantherophis guttatus* complex) and its implications on species delimitation**, *Thomas Marshall, University of Texas at Austin; Drew Davis, University of Texas Rio Grande Valley; David L Hillis, University of Texas at Austin*
Mitochondrial markers have been widely used over the past 30 years to study phylogeography and infer species boundaries. The utility of these markers for such studies is based on an assumption that variation within mitochondrial genes is largely neutral. However, evidence that different mitochondrial haplotypes within species confer differential fitness, and thus undergo selection, challenges this assumption. This, along with other factors, such as sex-biased dispersal and mitochondrial introgression across species boundaries, can lead to discordant genetic structure between mitochondrial and nuclear genomes. Mitonuclear discordance has been increasingly observed in a wide range of organisms, calling into question mitochondrial-based inferences of species boundaries. Here, we use a cytochrome-b sequence fragment and nuclear SNPs to investigate the presence of mitonuclear discordance in the North American corn snakes (*Pantherophis guttatus*), a complex that has been taxonomically defined by mitochondrial genetic structure. We identified five geographically partitioned mitochondrial haplotypes, indicating greater mitochondrial diversity than was previously recognized. However, only two of these haplotypes are monophyletic in our nuclear SNP phylogeny. Further, population structure analyses using nuclear SNPs provide little evidence of reproductive barriers across haplotype boundaries. We found that, in contrast to the mitochondrial genome, the primary phylogeographic break in the nuclear genome occurs at the Mississippi River. Based on these results, we argue that only two

species should be recognized in this group, and that the evidence supports a hypothesis of mitochondrial introgression across species.

3:15   033.239   G   **Synthesis, Characterization and CO Releasing Property of Palladium (II) Bipyridine Flavonolate Complexes**, *Sarah Lee Whitfield, Stephen F. Austin State University; Xiaozhen Han, Stephen F. Austin State University*

A series of bipyridyl (bpy) Pd(II) complexes with 3-hydroxyflavone (fla) [PdbpyflaR][BF4] (R=OCH3 (1), R= CH3 (2), R= H (3), R= Cl (4)) were prepared and characterized. The molecular structures of the four compounds were determined by UV-Vis, 1H NMR, 13C NMR, COSY, HSQC, HMBC, FTIR, ESI mass spectra, and elemental analysis. Their ability to release carbon monoxide was investigated through oxygenation reaction under various conditions of temperature and light irradiation. The nitroxygenation reaction was also studied with nitroxyl, HNO, generated in situ from Angeli's salt. The experimental results showed that oxygenation reaction of [PdBpyFla]+ with oxygen happens at high temperature (> 80º C) and light doesn't affect the reaction, whereas nitroxygenation reaction with HNO happens at room temperature without light irradiation. Carbon monoxide released from the complexes during the nitroxygenation reaction was trapped by deoxymyglobin.

Index of Session Participants