



## **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 recently 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.



Promoting strong science and education in Texas

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

### **Letter from the President of the Academy**

Welcome to the 121<sup>st</sup> annual meeting of the Texas Academy of Science at Midland College! Annual meetings have long been a significant function of the Academy and the fulfillment of our mission. The Academy promotes scientific research in the state, encourages research as part of student learning, and enhances the professional development of its professional and student members. First founded by teachers as the Academy of Science in Texas in 1880. Over a century later, the Academy continues to promote research through disciplinary sections at the annual meeting held each spring. Activities at this year's meeting include scientific talks and posters by students, scientists, and educators. The meeting will culminate with presentations by the Academy's Distinguished Scientist and its Outstanding Texas Educator for 2018, with an awards banquet to follow. With 16 active sections of the Academy spanning most scientific disciplines, TAS has a strong commitment to interdisciplinary networking and relationship building, research dissemination, and education. An important aspect of the Academy is a strong focus on student research. Many of this year's presentations will be from undergraduate and graduate students. We are proud to offer this platform for students to share their progress in science and mathematics research. Thank you for attending and making your contribution to this important event!

Every year, there are many people working behind the scenes to make our annual meeting successful. These **volunteers** spend countless hours building the program, reviewing abstracts, booking the facilities, planning the events and menus, and other planning activities. It is a great deal of work and is amongst the most important contributions our members can provide. This year's meeting would not be possible without these important volunteers. This year's Program Chair, Dr. Keith Pannell, local hosts, Dr. Thomas Ready and Dr. Margaret Wade, and the TAS Coordinator of Information Technology, Dr. Chris Vitek, were all instrumental in putting this year's program together. I would also like to thank the 32 Section Chairs and Vice Chairs who

reviewed and edited the many abstracts within their field. Our section leaders are the front line of our organization! Thanks to all of you who have served in this important capacity. I also encourage others to get involved in your section leadership. It is a very fulfilling experience. Please take the time to thank your section leaders for all their hard work! In addition to those listed above, Dr. Jason Locklin, Immediate Past President and Elections Chair, headed the 2018 officer election. Drs. Cathy Early, Karen Grant, Shannon Hill, and Don Harper coordinated the judging of presentations, posters, and research grant proposal submissions.

Also remember, the *Texas Journal of Science* is back on schedule this year and continues to actively seek submissions. This is great news for the Academy and I'd like to thank Drs. Andy Kasner, managing editor of TJS, and Allan Nelson, the previous manuscript editor of TJS. I would also like to thank Kathryn Perez for stepping into the role as our new manuscript editor in 2018.

Finally, please enjoy the 121<sup>st</sup> meeting of the Texas Academy of Science. And to our student members, remember this great Academy when you graduate and move into your career. Bring your students to TAS so that they can also reap the benefits of this historic and important organization. I did!

A handwritten signature in black ink that reads "Neil Gray". The signature is written in a cursive, flowing style with a long horizontal stroke at the end.

Neil Gray, Ph.D.  
President, Texas Academy of Science 2017-2018



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# Midland College

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February 13, 2018

It is with much pleasure that I welcome you to the 2018 Annual Meeting of the Texas Academy of Science held on the Midland College (MC) campus!

West Texas is a unique and geographically large part of Texas. The region is known for its beautiful skies and sunsets and for its oil wells. Although the topography is barren, consisting of desolate high plains scattered with tumbleweeds and mesquite with a very arid climate, the people of West Texas are well known for their warmth and "get it done" attitude.

One can say that Midland College has a reach that is truly "Texas sized". Midland College's service area covers Midland County and the more rural counties of Pecos, Reagan, Crockett, and Upton. Together, these counties cover 10,803 square miles (larger than the state of Maryland). Midland College also offers academic on-line classes which are accessible world-wide.

Midland is a city built by scientists. As the center of the Permian Basin oil industry, we are mindful of the importance of science as we see all disciplines represented in the work of our citizens. It is an honor to have members of the Texas Academy of Science on our campus.

We hope you have a productive and enjoyable stay. Welcome to Midland College.

Sincerely,

*Margaret Wade*

Margaret Wade, EdD  
Dean of Mathematics and Science  
Midland College

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STATE OF TEXAS  
OFFICE OF THE GOVERNOR

**Greetings:**

As Governor of Texas, I am pleased to welcome everyone to the 121<sup>st</sup> annual meeting of the Texas Academy of Science.

The 21<sup>st</sup> century continues to usher in a landmark era of ingenuity and scientific exploration, demanding an increasingly specialized workforce capable of building on the progress that has been achieved. Texas' workforce must be continually renewed and refined through education if we want to maintain our edge and compete for jobs. For more than a century, the Texas Academy of Science has done just that — taking bold steps to realize the full potential of young Texans by awarding thousands of dollars in research grants.

I commend the scientists and educators present for their ongoing commitment to obtaining knowledge and life experiences that will lead to success and achievement. Whatever your profession in years to come, if you remain committed to excellence, you will make a difference.

First Lady Cecilia Abbott joins me in sending best wishes for an enjoyable and memorable evening.

Sincerely,

A handwritten signature in black ink that reads "Greg Abbott".

Greg Abbott  
Governor

JOHN CORNYN  
TEXAS



**United States Senate**  
WASHINGTON, D.C. 20510

March 2, 2018

Texas Academy of Sciences

Dear Friends:

I was pleased to learn that the Texas Academy of Sciences is holding its 121st Annual Meeting. This is a milestone of which you can be very proud.

Your efforts to promote research and new discoveries in science continue to serve as an example for the state of Texas. I send my best wishes for a successful event and encourage you to continue pursuing excellence in the years to come.

Sincerely,

A handwritten signature in blue ink that reads "John Cornyn". The signature is stylized and fluid.

JOHN CORNYN  
United States Senator

February 22, 2018

Dr. Keith Pannell  
President-Elect and Program Chair  
Texas Academy of Science (TAS)  
1201 West University Drive  
Edinburg, TX 78539

Dear Dr. Pannell,

It is a pleasure to join you in marking the opening of the 121<sup>st</sup> Texas Academy of Science meeting. As aspiring and established scientists from across Texas and many disciplines gather in Midland for three days of engagement on research and possibilities, it is an honor to welcome and encourage them in their endeavors.

At the heart of every scientist is the courage to ask “Why?”, a question that can be transformative when pursued with passion, perseverance, and scientific integrity. The ability to take the answers to that question and turn them into cures and solutions means opportunities never imagined before each discovery. The discoveries made every day by the people gathered here give hope to our world and take us to exciting new horizons.

It is organizations like TAS that foster collaboration, expedite implementation of solutions, and advance research at extraordinary speeds. Married with the revolutionary technology found in Texas college and university laboratories, the attendees here today are a part of a remarkable time in the history of science.

As you prepare to engage on research and topics that are critical to the lives of Texans and Americans, let us remember the words of Isaac Newton who once said, “If I have seen further, it is by standing on the shoulders of giants.” Everyone attending stands on the shoulders of brilliant and bold men and women whose relentless efforts have made possible the extraordinary research discussed over the next 3 days. Our thanks goes to those who established the Texas Academy of Science and those who made possible this meeting. Their leadership, innovation, and guidance have made TAS a dynamic part of our state and nation’s scientific community.

I look forward to celebrating the achievements of those present as you work to turn your questions into action for the benefit of our world and nation. May each of you never lose your hunger for answers.

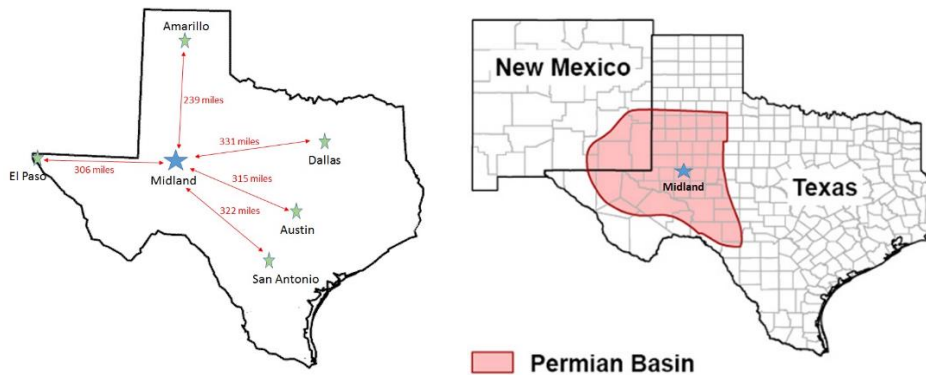
Sincerely,



Ted Cruz  
United States Senator

## Midland, Texas

Originally named “Midway”, Midland, Texas has been the historical way-station for travel and trade between Dallas and El Paso. This feature became definitive when the Texas-Pacific Railroad was built across Texas. The original drivers of the local economy were cattle and agriculture (primarily cotton farming).



In the 1920's a large, extended series of oil reservoirs were discovered in the area and termed the “Permian Basin” after the geological era in which they were formed. Oil production has been the predominant industry in the area ever since. The Permian Basin has been one of the most prolific oil producing areas ever. The city of Midland has served as the unofficial capital of oil production in the Permian Basin since the 1940's when many of the major oil companies set up their regional offices here. New technologies in oil production continue to make the Midland area a vital hub in the energy sector. Midland has a (est.) population of 150,000 and its sister city, Odessa, also has a (est.) population of 150,000.

The city has a variety of cultural attractions including Midland-Odessa Symphony and Chorale, the Petroleum Museum, the Commemorative Air Force Museum, and the Museum of the Southwest (with planetarium) to name a few.

Midland International Airport has been a vital conduit of travel for the oil industry. It is now one of nine FAA licensed space ports in the U.S., and one of three licensed spaceports in Texas. Midland International Airport is the only public commercial space port in Texas (the other two being the private *Space X* launch site in South Texas and the private *Blue Origin* launch site near Van Horn, Texas).

Combined, the Midland and its sister city Odessa have a (est.) population of 300,000 people which support a myriad of arts and cultural endeavors such as the annual Midland Blues Festival, the annual Rock-the-Desert Christian rock festival, and the Midland Community Theater. The Wagner-Noel Concert Hall hosts many touring performers such as Rod Stewart, Celtic Women, and the 65-year-old Midland-Odessa Symphony Orchestra. There are several museums of note including the Petroleum Museum, the Commemorative Air Force Museum, and the Museum of the Southwest (with planetarium) to name a few.

The city has a minor league baseball team, the Midland Rockhounds, which are the AA farm team for the Oakland A's that compete in the historic Texas League. There is a wide selection of retail and restaurants in the city.





**Midland College** was formed in 1972 as a 2-year community college to serve the regional population. With an enrollment population of 6,000 students, the college's service area of 12,008 square miles encompasses 5 counties and is larger than the state of Rhode Island. Beyond the West Texas region, Midland College offers many of its science courses on-line and via video-conferencing which make its courses available world-wide. Part of its mission is to offer the premier opportunity in STEM education for freshman/sophomore curricula that can be had. Toward that end, Midland College has invested in science facilities and faculty that promote ongoing undergraduate research in Geology, Engineering, Chemistry, Biology, and Marine Science. Articulation agreements are in place for the transfer of academic credits to universities in the University of Texas System, the Texas A&M system, the Texas Tech University system, and the Texas State University system as well as private colleges and universities. The college reflects the diverse population that it serves and is proud to be designated a Hispanic Serving Institution (HSI).



Figure 1: Aerial View of the Midland College Campus



Figure 2. The carillon and The F. Marie Hall Building on the Midland College campus.

## Local Eateries

<i>Restaurants within a 5 minute drive of</i>	<i>Restaurants within a 5 minute drive of</i>	<i>Restaurants within a 5 minute drive of</i>
<b>Midland College</b>	<b>Midland College</b>	<b>Midland College</b>
<b>Cattle Barron's Steakhouse</b>	<b>Swensen's Ice Cream</b>	<b>Chipotle Mexican Grill</b>
418 W Wadley Ave, Midland, TX 79705	900 W Loop 250 N Ste C, Midland, TX 79705	2820 Loop 250 Frontage Rd #210, Midland, TX 79705
Phone: (432) 683-2334	Phone: (432) 570-7271	Phone: (432) 699-0173
<b>Dos Compadres Mexican Restaurant</b>	<b>Jorge's Mexican Café</b>	<b>Palio's Pizza Café</b>
2200 W Wadley Ave #1, Midland, TX 79705	4400 N Big Spring St #14, Midland, TX 79705	2900 N Loop 250 West #100, Midland, TX 79707
Phone: (432) 203-6490	Phone: (432) 683-6303	Phone: (432) 699-1388
<b>The Garlic Press</b>	<b>Outback Steakhouse</b>	<b>Mr. Gatti's Pizza</b>
2200 W Wadley Ave # 6, Midland, TX 79705	2314 W Loop 250 N, Midland, TX 79705	614 W Wadley Ave, Midland, TX 79705
Phone: (432) 570-4020	Phone: (432) 684-1152	Phone: (432) 688-3977
<b>Venezia Italian Restaurant</b>	<b>Cotton Patch Café</b>	<b>Dickie's Barbeque</b>
2101 W Wadley Ave #20, Midland, TX 79705	2320 Loop 250 Frontage Rd, Midland, TX 79705	600 W Wadley Ave, Midland, TX 79705
Phone: (432) 547-4046	Phone: (432) 618-0070	Phone: (432) 704-5080
<b>Ray's Italian Bistro</b>	<b>Chili's Bar &amp; Grill</b>	<b>Mulberry Café</b>
2300 W Wadley Ave, Midland, TX 79705	2100 Loop 250 Frontage Rd, Midland, TX 79705	2101 W Wadley Ave #8, Midland, TX 79705
Phone: (432) 682-7297	Phone: (432) 687-3744	Phone: (432) 704-5221
<b>Manny's Italian Village Ristorante</b>	<b>Jason's Deli</b>	<b>Jumburrito</b>
3211 W Wadley Ave, Midland, TX 79705	4610 N Garfield St, Midland, TX 79705	2101 W Wadley Ave, Midland, TX 79705
Phone: (432) 684-6595	Phone: (432) 682-2200	Phone: (432) 683-7017
<b>Strawberry Field's Café</b>	<b>International House of Pancakes</b>	<b>Firehouse Subs</b>
2311 W Wadley Ave, Midland, TX 79705	2507 Loop 250 Frontage Rd, Midland, TX 79705	2900 Loop 250 Frontage Rd #162, Midland, TX 79705
Phone: (432) 684-5869	Phone: (432) 684-5759	Phone: (432) 689-6500
<b>Murray's Deli</b>	<b>Olive Garden Italian Restaurant</b>	<b>Five Guy's Burgers &amp; Fries</b>
3211 W Wadley Ave #24, Midland, TX 79705	2705 Loop 250 Frontage Rd, Midland, TX 79705	2816 Loop 250 Frontage Rd #300, Midland, TX 79705
Phone: (432) 697-3433	Phone: (432) 687-4400	Phone: (432) 699-2036
<b>Subway Sandwiches</b>	<b>Panera Bread Restaurant</b>	<b>Restaurants of Note:</b>
2300 W Wadley Ave Ste B, Midland, TX 79703	2804 Loop 250 Frontage Rd, Midland, TX 79705	<b>Luigi's Italian Restaurant</b>
Phone: (432) 682-5541	Phone: (432) 689-0933	111 N Big Spring St, Midland, TX 79701
<b>Pizza Hut</b>	<b>Abuelo's Mexican Restaurant</b>	Phone: (432)-683-6363
2200 W Wadley Ave, Midland, TX 79705	2908 Loop 250 Frontage Rd, Midland, TX 79705	<b>Michael's Charcoal Grill (Barbeque)</b>
Phone: (432) 683-2240	Phone: (432) 685-3335	723 W Wadley Ave, Midland, TX 79705
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## Texas Journal of Science: Update

The editorial staff is glad to report that the journal is on schedule. The final issue of Volume 69 (2017) should have reached your mailbox in February. We are currently accepting manuscripts for Volume 70 (2018), with the first issue scheduled to be published in June 2018 in the new online format. We will also be mailing a print version of Volume 70 at the end of the year, and in future years members and subscribers will have the option to receive a print version at the end of each year. For now, manuscripts should be submitted via email to the Manuscript Editor, Dr. Kathryn Perez ([kathryn.perez@utrgv.edu](mailto:kathryn.perez@utrgv.edu)). Stay tuned to the TAS website for updated Author Guidelines and submission instructions, as we will be launching a new online manuscript submission and review system later this spring. We will send out an announcement as those changes take effect. We hope you have an excellent 2018!

Andrew C. Kasner, Ph.D.      Managing Editor, Texas Journal of Science

## **Meeting Notes and Poster Guidelines**

**Registration.** The Registration area, in rooms 124, 125, 126, 127 & 128 of the F. Marie Hall Building, will be open from 10.00 am on Friday March 2 until 4.00 pm, and again on Saturday March 3 from 7.0 am until 12.00 pm.

**Parking.** Parking anywhere, except specifically reserved or handicapped sites, is possible on the Midland College Campus.

**Posters.** Posters will be set up in the Marie Hall Building Corridor area on Friday commencing at 10.00 am. **We request all posters to remain “up” for the duration of the meeting to permit maximum viewing.** The take-down period will be after 3.30 pm on Saturday March 3.

**Poster Judging** will be between 2.30 pm and 4.00 pm on Friday for the following sections:

Anthropology; Botany; Conservation Ecology; Environmental Science; Freshwater Science; Geosciences; Mathematics & Computer Science; Neuroscience; Physics & Engineering; Science Education; Terrestrial Ecology & Management.

**Poster Judging** for the remaining sections: Biomedical; Cell & Molecular Biology; Chemistry & Biochemistry; Marine Science; Systematics & Evolutionary Biology, will be on Saturday between 10.00 am and 12.00 pm.

Since we anticipate, and encourage, more poster viewing and readership outside the judging time periods, we suggest that contact emails (or other contact details you are comfortable with) associated with the presenter, be clearly noted on the poster to encourage further communication during the meeting.

### **Saturday Lunch**

Dr. Tom Ready, our local Host, has arranged for a speaker at this lunch, Bill Bynum, outlining his adventures as a Scuba Enthusiast see below. The lunch will be in two adjacent locations within the Scharbauer Student Center.

### **Saturday Reception and Banquet**

A cash bar reception and an exhibit of various vintage and modern airplanes will be available at our banquet site, the Commemorative Air Force Main hanger starting at 6.30 pm Saturday.

## Bill Bynum, Lunch speaker, Saturday, March 2.

Bill Bynum was born and raised in Midland. After graduation from Midland High School in 1970, he attended SMU where he earned undergraduate and graduate degrees in Finance and Accounting. As a junior in high school, primarily as an excuse to get out of the house on school nights, Bill obtained his scuba diving certification at the YMCA and began diving Texas lakes. A year later, he and a friend arranged a scuba trip to the Bahamas. It was there that he rented a camera, took his first underwater images and fell in love with the ocean. College and career got in the way of scuba vacations until the early 80's, when he started diving again in earnest, primarily in the Caribbean. Bill can actually say he met his wife Carol on a desert island while scuba diving! They discovered Indonesia in the 90's and marveled at the extraordinary beauty and marine diversity. Since then, Carol and Bill have traveled the "Coral Triangle" area of the South Pacific extensively on traditional two-masted Indonesian "Phinisi" sailing vessels in pursuit of the most pristine reefs and exotic creatures. They regularly dive on reef systems that rarely, if ever, have seen scuba divers. The images in this presentation are from their 2008-2014 trips to the Indonesian Archipelago and Papua New Guinea.



We wonder if Bill ever met this phenomeon under the waves, i.e. our local host Dr. Tom Ready mentoring a student down under.



## 2018 Outstanding Texas Educator



Mrs. Megan Gabriel, MSMT  
Denton High School, Denton, Texas

Megan Gabriel earned her bachelor's and master's degrees in mathematics educations from Texas Woman's University in 2007 and 2012. She has been teaching at Denton High School in Denton, Texas since 2011. In addition to her responsibilities as department chair, Mrs. Gabriel works at Texas Woman's University to prepare future educators for their certification exams. Mrs. Gabriel's teaching responsibilities include PreAP PreCalculus and Dual Credit PreCalculus.

Mrs. Gabriel has been recognized for her teaching, being named the Teacher of the Year at Denton High School three years running, from 2014 to 2016. Recently, she was nominated as a Texas State Finalist for the Presidential Awards for Excellence in Mathematics and Science Teaching.

The school motto of Denton High School, Dedication Honor Success, is one Mrs. Gabriel takes to heart, devoting herself to not only the education of students on campus, but to those beyond the classroom. She actively engages her students and pushes them to succeed, positively affecting student achievement throughout the campus.

While recognition from peers is always welcome, when it comes from students, it is even more meaningful. In the words of a former student, "Mrs. Gabriel understands that relationships must come first. I hated math but I know she cares about me and I don't want to disappoint her. She makes learning math fun."



## 2018 Texas Distinguished Scientist



Dr. Purnendu K. (Sandy) Dasgupta  
UT Arlington

Dr. Purnendu K. Dasgupta received his bachelor's and master's degrees from the University of Burdwan, India. He then pursued his Ph.D. in analytical chemistry at Louisiana State University, completing his degree in 1977. He has worked tirelessly in the field for 40 years.

Dr. Dasgupta is truly one of a very few, truly broad based researchers in the field of analytical chemistry. He has spent the majority of his distinguished career in Texas, at Texas Tech University and University of Texas at Arlington, currently holding the Hamish Small Chair in Ion Analysis and as the Jenkins Garrett Professor of Chemistry. His research efforts are prolific, with well over 400 papers, numerous US and International patents, textbooks and contributions. He has been recognized for his efforts, receiving; the 2017 Talanta Gold Medal Award in Analytical Chemistry; the Giorgio Nota Medal for Lifetime Contributions to Open Tubular Liquid Chromatography in 2017; and the American Chemical Society National Award in Chromatography in 2011, to name only a few.

The range of Dr. Dasgupta's research is truly astonishing. He is always looking for the next challenge. While he has been incredibly successful as a researcher, he has also been recognized for his excellence in teaching. In 2016, He was recognized with the J. Calvin Giddings Award in Chemical Education from the American Chemical Society. The recipients of this award are those who help to shape the field for students and educators of all ages and experience levels through their textbooks, innovative teaching approaches, design of teaching laboratories, and publications on teaching in the field.

It is not easy to summarize Dr. Dasgupta's accomplishments. His enthusiastic devotion to his chosen career and those he works with is truly inspiring. People from around the world clamor for the opportunity to work with him and he goes to great lengths to support them, while in his lab and after.



**Shannon Hill**  
2018 Vice President

Shannon Hill's family consists of 5 generations of Texans, hailing from the piney woods of east Texas and the post oak savannah of Madison county. As a military dependent, Dr. Hill's youth was spent traveling across the United States and in 2001, she settled in Waco, Texas, where she remains today. She earned a Master of Arts in Teaching from East Tennessee State University in 1999 and Ph.D. in biology from Baylor University in 2008. Her dissertation research focused on the impact of urbanization on the structure of the freshwater turtle community in the Brazos River.

Dr. Hill is an assistant professor at McLennan Community College (MCC) and an adjunct instructor for Texas Tech Waco. She serves on the advisory committee for MCC's Honors Council, is a mentor for honor students, serves on ad-hoc committees for curriculum development and is a founding member and co-sponsor of MCC's Biology Club. Dr. Hill is a strong advocate of science education through research experience. To this end, she is a member of the Texas Integrated Diving and Ecological Studies Laboratory (TIDES), which is a multi-institutional NSF funded undergraduate research program that develops and executes student-driven research projects on the Mesoamerican Barrier Reef in Roatán, Honduras.

Dr. Hill has been a board member of the Texas Academy of Science (TAS) since 2012, serving as the Graduate Academy Counselor, chairing the research awards committee and as a member of the development committee. In this capacity, she advocates for the needs of the academy's graduate students, coordinates the graduate student competition and assists in fundraising. She participates in community outreach by serving as a judge for the Central Texas Science and Engineering Fair. In addition to her active participation in TAS, Dr. Hill is a member of the American Association for the Advancement of Science, Herpetologists League, Society for the Study of Amphibians and Reptiles and the Texas Association of Community College Teachers.



## **David Lemke**

2018 - 2021 Academic Director

David Lemke is in his 34th year of teaching at Texas State University, where he holds the rank of professor and currently serves associate chair for graduate programs and graduate advisor. He is a recipient of the Texas State University President's Award for Excellence in Teaching, and the Tri-Beta Biological Honor Society's teaching excellence award.

Dr. Lemke's research is focused on the vegetation of Texas and has included floristic surveys, morphological, anatomical, and ecological studies of aquatic and terrestrial angiosperms, paleobotanical investigations of fossil wood anatomy, and botanical history. He is the author of approximately 50 reviewed articles and has authored or coauthored presentations, often with graduate or undergraduate students, at every Texas Academy meeting, except one, since 1988.

Dr. Lemke received his bachelor's degree in biology from Bucknell University and a doctorate in botany from U. T. Austin. After holding visiting teaching appointments at Louisiana State University and The University of Texas at El Paso, he assumed his current position at Texas State University. He is a reviewer for a variety of botanical journals and textbook publishers, served as newsletter editor for the Texas Organization for Endangered Species and associate editor for botany for the *Southwestern Naturalist*. He organizes the annual run the Christmas Mountains Research Symposium in the Big Bend region. He frequently lectures to public groups, e.g. the Native Plant Society of Texas, central Texas Master Gardener and Master Naturalist programs. He has served as chair of the Botany Section for the Texas Academy of Science and was elected a Fellow of the Academy in 1990. He holds appointments with the Botanical Research Institute of Texas in Ft. Worth and the Department of Integrative Biology at UT Austin. He is a member of the Botanical Society of America, the American Society of Plant Taxonomists, the International Association of Plant Taxonomists, the Cactus and Succulent Society of America, and the Southwestern Association of Naturalists.



## **June Wolfe III**

2018 - 2021 Non Academic Director

Dr. Wolfe holds an undergraduate degree in Biology/Chemistry from The University of Texas at Austin, an MS in Horticulture from Texas A&M University and a PhD in Aquatic Biology from Baylor University. He directs the Water Science Laboratory at Texas A&M AgriLife Research Blackland Research and Extension Center in Temple, conducting basic and applied research in water conservation and management with an emphasis on investigating erosion and sedimentation caused by stormwater and land disturbance. Dr. Wolfe is interested in the use of grasses as ornamental species for water and resource conserving landscapes of high aesthetic value. With shrinking water supplies and growing population, interest in Aquifer Storage and Retrieval in Texas has opened opportunities for Dr. Wolfe to provide research in sound, science-based alternatives for increasing and protecting Texas' water supply.

Dr. Wolfe serves as a mentor to college and High School students on water-related projects through internship programs at Temple College and the Texas Bioscience Institute. He has served as adjunct professor of Biology for Temple College. He also leads science-based activities, for children of military families. Beyond water issues, his other interests include astronomy (he built his own telescope), radio and electronics (recently built a lightening detector), native plants and their benefits, and tying his own fishing flies.

Dr. Wolfe was awarded an NSF Fellowship in 2009 to study lake ecology in Japan where he established research partnerships with Japanese researchers from Shimane University in Matsue and continues to cooperate on water-related research projects. He is a member of the American Water Resources Association. He has worked for the Texas A&M System since 1987 and in Water Quality for the last 22 years. Dr. Wolfe has been involved with the Texas Academy of Science through poster presentations at annual meetings and has two articles published in the Academy's publication, The Texas Journal of Science.



**AHM Zuberi Ashraf**

2018 – 2020 Student Director

Mr. A H M Zuberi Ashraf is a senior in the Biology program at the Texas A&M University-Central Texas (TAMUCT). Zuberi is pursuing a bachelor degree in biology with a biotechnology concentration and a minor in chemistry. He has earned two associate degrees in Biotechnology and Chemistry with honors from Temple College. Zuberi is actively involved in research at Texas A&M University-Central Texas where he is studying the microbiome sequence of the honey bee gastrointestinal tract and honey stomach and at the Texas A&M Health Science Center in Temple, Texas where his research group is testing natural compounds on ovarian cancer cells in vitro to formulate a more effective natural and safer treatment procedure for treating this cancer.

In 2017, Zuberi was awarded a trainee travel award to present his ovarian cancer research at the annual meeting of Central Society for Clinical and Translational Research (CSCTR) in Chicago. He earned 2<sup>nd</sup> place in the Life Science Poster Presentations at the 14<sup>th</sup> Annual Texas A&M System Pathways Research Symposium at Tarleton State University for presenting his research on honey bees. With his research group at Texas A&M Health Science Center, Zuberi has published a peer-reviewed paper in the International Journal of Research and Public Health. He was also awarded the Outstanding Undergraduate Student in Biology award by the TAMUCT College of Arts & Sciences for his academic excellence. His extra-curricular activities include serving as a senator at-large for the TAMUCT Student Government Association, TAMUCT student representative for the Chancellor's Student Advisory Council, President of TAMUCT International Students Association, and a founding member and former vice-president of TAMUCT Science Club. Zuberi is also an inducted member of the TAMUCT Chapter of National Society of Leadership & Success.

### **2018 Texas Academy of Science Fellow**

Lisa Goering, St. Edwards University



## Graduate Student Competition

A single session will be held, Saturday March 3, 1.30 pm – 3.30 pm, in the Carrasco Room, Scharbauer Student Center without any conflicting sessions, thereby enabling maximum participation.

Evaluating suitable habitat of invasive tilapia and forecasting hotspots for potential impacts on imperiled fishes of Texas, **Elizabeth L Roesler**, Texas Tech University

Post-op bleeding in a patient with noonan syndrome and factor XIII deficiency: a case study, **Tyler Jay Homewood**, UNTHSC/TCOM.

Role of Time in K9 Narcotic Training Aids: Perspectives on Working Dog Performance, **Lauren Alejandro**, Texas Tech University.

An Implantable Flow Monitor for Hydrocephalus, **Chuchu Qin**, University of Texas at Arlington.

Triethylsiloxyethyl-N,N-Dimethylamine as a Mannich Reagent: The Varied Chemistry with Anilines, **Anwar Jacintomoreno**, The University of Texas at El Paso.

Detecting presence or absence of alternative splicing at the *superkdr* locus in horn fly, *Haematobia irritans*, **Gabriela Solis**, Texas State University.

Laser-Enhanced Sustained Attention and Working Memory in Neurocognitive Disorder, **Celeste L. Saucedo**, University of Texas at Austin.

Specimen dates and species longevity: an evaluation of temporal range data for questions of ancestry in the hominin fossil record, **Timothy Lee Campbell**, Texas A&M University.

Synthesis of Biodiesel Fuels via Transesterification Using Acorn (*Quercus sp.*) as an Alternative Triglyceride Source, **Darean Bague**, Stephen F. Austin State University.

The taxonomic and anatomical diversification of mosasaurs during the Late Cretaceous: a study system for understanding evolution in a greenhouse world, **Joshua Ryan Lively**, The University of Texas at Austin

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**Complete Technical Program**

**Friday, March 2**

**001. TAS Board Meeting**

8:00 to 11:30 am

Jack E. Brown Dining Hall, Foundation Room  
Texas Academy of Science Annual Meeting  
TAS Board Meeting

**002. Section Chairs Pre-Session Lunch Meeting**

11:30 am to 12:30 pm

Jack E. Brown Dining Hall, Foundation Room  
Texas Academy of Science Annual Meeting  
Section Chairs Pre-Session Lunch Meeting

**003. Botany Oral Session & Section Meeting**

12:30 to 2:30 pm

F. Marie Hall Building, 201

Botany

Botany Oral Session & Section Meeting

Chair: **Martin Kilman Terry**, Sul Ross State University

Participants:

- 12:30 003.001 U **A pilot study: Bio-flocculation of Chlorococcum microalgae via fungal association**, Joanne Elise Thomson; Kathleen Wood, University of Mary Hardin-Baylor
- 12:45 003.002 G **Correlation of mescaline concentration in crown tissue samples of *Lophophora williamsii* (Cactaceae) with rib number**, Richard Paul Newbold; Martin Kilman Terry, Sul Ross State University
- 1:00 003.003 G **Mescaline content in over-the-counter anti-rheumatics presumed to contain *Lophophora williamsii* (peyote)**, Robert Joseph LeBlanc; Martin Kilman Terry, Sul Ross State University
- 1:15 003.004 N **Phylogenetic reconstruction of *Mentzelia* section *Bicuspidaria* (Loasaceae) based on plastid and nuclear ribosomal DNA sequences.**, Joshua M. Brokaw, Abilene Christian University; John J. Schenk, Georgia Southern University
- 1:30 003.005 N **The angiosperm family Lauraceae in Texas**, David E. Lemke, Texas State University
- 1:45 003.006 **Section Meeting**, Martin Kilman Terry, Sul Ross State University

**004. Chemistry & Biochemistry Oral Session 1**

12:30 to 2:30 pm

F. Marie Hall Building, Room 101

Chemistry and Biochemistry

Chemistry & Biochemistry Oral Session 1

Chair: **Adrian L Zapata**, Schreiner University

Participants:

- 12:30 004.007 N **Can lanthanide glutarate chlorides be converted into lanthanide glutarate terephthalates?**, Ralph Zehnder, Angelo State University

12:45 004.008 U **Cobalt porphyrins supported by zirconium phosphate layers as OER electrocatalysts**, Isabel Barraza; Dino Villagran, University of Texas at El Paso

1:00 004.009 U **Computational studies of radiofluorinated Gallium Complexes with potential use as PET imaging agents**, Aaron Torres; Maria Benavides, University of Houston-Downtown: Department of Natural Sciences

1:15 004.010 U **Control of metal nanoparticle parameters using polyamine capping agents**, Michael Ray Hayes; Thomas Edward Ready, Midland College

1:30 004.011 G **Efficient photocatalyst for visible light water photolysis**, Tahmina Akter; Geoffrey Saupe, University of Texas at El Paso

1:45 004.012 G **Theoretical calculations of UV-Vis spectrum and binding energies of TMPyP and TPYP porphyrins with Pb<sup>2+</sup>, Hg<sup>2+</sup>, Cu<sup>2+</sup>, Cd<sup>2+</sup>, Zn<sup>2+</sup>, and Fe<sup>2+/3+</sup>**, Christopher Orr; Brian Barngrover, Stephen F. Austin State University

2:00 004.013 U **Theoretical stereochemistry of Co(II) IDA with histidine tags to identify binding energies utilizing DFT**, Lindsey Ohmstede; Brian Barngrover, Stephen F. Austin State University

2:15 004.014 U **Fundamental growth mechanism of thiolate protected platinum nanoparticles**, Alexandria Cook; Brian Barngrover, Stephen F. Austin State University

**005. Conservation Ecology Oral Session & Section Meeting**

12:30 to 2:30 pm

F. Marie Hall Building, 202

Conservation Ecology

Conservation Ecology Oral Session & Section Meeting

Chair: **Chris Distel**, Schreiner University

Participants:

- 12:30 005.015 N **Misidentification of land snails in museum collections**, Jeff Nekola, University of New Mexico; Ben Hutchins, Texas Parks and Wildlife; Briante Najev; Alison Schofield; Kathryn Elizabeth Perez, University of Texas Rio Grande Valley
- 12:45 005.016 G **Nesting ecology of Common Black Hawk (*Buteogallus anthracites*) and Gray Hawk (*Asturina nitida*) at Big Bend National Park**, Fabiola Baeza-Tarin, Sul Ross State University
- 1:00 005.017 N **New distribution records for amphibians and reptiles of East-Central Chihuahua, Mexico**, Tomas Hernandez, Midland College; Mark Herr, University of Kansas; Skylar Stevens, Sul Ross State University; Sean Graham, Sul Ross State University
- 1:15 005.018 N **Prey of the Loggerhead Shrike *Lanius ludovicianus* in West Texas**, Sean Graham; Morgan Seiler; Crystal Kelehear, Sul Ross State University
- 1:30 005.019 U **Survey of reptiles and amphibians of the**

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**Trans-Pecos Region, Texas, Noah Koby Fields; Sean Graham, Sul Ross State University**

- 1:45 005.020 G **Terrestrial snail population assessment in the Rio Grande Valley of Texas**, Briante Najev; Jeff Nekola, University of New Mexico; Ben Hutchins, Texas Parks and Wildlife; Alison Schofield, University of Texas Rio Grande Valley; Kathryn Elizabeth Perez, University of Texas Rio Grande Valley
- 2:00 005.021 **Section Meeting**, Chris Distel, Schreiner University

**006. Freshwater Science Oral Session & Section Meeting**

12:30 to 2:30 pm

F. Marie Hall Building, 203

Freshwater Science

Freshwater Science Oral Session & Section Meeting

Chair: **Russell Minton**, University of Houston Clear Lake

Participants:

- 12:30 006.022 G **Determining the host fish of a state-listed freshwater mussel species, *Pleurobema riddellii***, Elizabeth Hinkle, University of Texas at Tyler
- 12:45 006.023 U **Effects of the insecticide imidacloprid on habitat selection in the freshwater amphipod *Hyllera azteca***, Jonatan Valentin Salinas; Raelynn Deaton Haynes, St. Edward's University
- 1:00 006.024 U **Flood pool distribution and seasonal recruitment of zebra mussels in a subtropical reservoir along the southern invasion front**, Devin Corbitt; Jason Locklin, Temple College
- 1:15 006.025 U **Following the curve: Environmental DNA accumulation and degradation rates utilizing apple snails**, Madison Granier, Southwestern University; Matthew A Barnes, Texas Tech University; Romi L Burks,
- 1:30 006.026 U **Unraveling the mystery: Species determination and distribution patterns of two Asian mysterysnail species (*Cipangopaludina japonica* and *C. chinensis*)**, Shannon M Walsh; Romi L Burks, Southwestern University
- 1:45 006.027 **Section Meeting**, Russell Minton, University of Houston Clear Lake

**007. Geosciences: Oral session 1**

12:30 to 2:30 pm

F. Marie Hall Building, 105

Geosciences

Geosciences: Oral session 1

Chair: **Russell LaRell Nielson**, Stephen F. Austin State University

Participants:

- 12:30 007.028 G **An insight into the origin of midcontinent unconventional using an integrated mineralogical and geochemical approach**, Giovanni Zanoni; Branimir Segvic, Texas Tech University
- 12:45 007.029 U **A study of luocobands in the Wax**

**Factory Laccolith, Big Bend Ranch State Park, TX., Olivia Rose Enriquez, Sul Ross State University**

- 1:00 007.030 U **Clay minerals as Quaternary climate change indicators in the Southern High Plains, West Texas**, Moustapha Diaby; Giovanni Zanoni; Dustin Sweet; Branimir Segvic, Texas Tech University
- 1:15 007.031 U **Dendrochronology: A tool to explore past climate of San Antonio**, Janice Davila; Jillian Guse; Darcy McCutchen, Univer of the Incarnate Word; Mireles Brittany; Kyle Sanchez; Gerald Mulvey, University of the Incarnate Word
- 1:30 007.032 N **Development of rill marks on the beach face at Galveston Island State Park, Texas**, Russell LaRell Nielson, Stephen F. Austin State University

**008. Neuroscience Oral Session & Section Meeting**

12:30 to 2:30 pm

F. Marie Hall Building, 209

Neuroscience

Neuroscience Oral Session & Section Meeting

Chair: **Veronica Giselle Martinez-Acosta**, University of the Incarnate Word

Participants:

- 12:30 008.033 U **A molecular study of the effects of BPA on hippocampal neurons**, Hannah Reiley; Danielle D. Grove, Texas Lutheran University
- 12:45 008.034 G **Positive cognitive and affective effects of transcranial infrared laser stimulation of the human prefrontal cortex**, Courtney Alexander; Celeste L. Saucedo; Douglas W.; F. Gonzalez-Lima, The University of Texas at Austin
- 1:00 008.035 **Section Meeting**, Veronica Giselle Martinez-Acosta, Univ. of the Incarnate Word

**009. Systematics and Evolutionary Biology Oral Session & Section Meeting**

12:30 to 2:30 pm

F. Marie Hall Building, 107

Systematics and Evolutionary Biology

Systematics and Evolutionary Biology Oral Session & Section Meeting

Chair: **Megan S Keith**, South Plains College

Participants:

- 12:30 009.036 U **A new assemblage of mosasaurs from the Upper Cretaceous Savoy Pit, Austin Chalk, North Texas**, Blake Russell Chapman; Joshua Ryan Lively, The University of Texas at Austin
- 12:45 009.037 G **A new Miocene gerrhonotine from the Caliente Formation, California**, Simon Scarpetta, University of Texas at Austin
- 1:00 009.038 G **A preliminary molecular phylogeny of the Eastern US *Oxyloma* (Gastropoda: Succineidae)**, Marco Arturo Martinez Cruz; Kathryn Elizabeth Perez,



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University of Texas Rio Grande Valley

- 1:15 009.039 U **Does the Dear Enemy Hypothesis hold true in a sex role reversed system**, *Sygnathus scovelli?*, Sarah Joanne Morton; Briana Martinez; Claire Adams; Ciara Crochet; Pam Cisneros; Raelynn Deaton Haynes; Sunny Scobell, St. Edward's University
- 1:30 009.040 U **Impact of social context on mating behavior and sperm competition in the western mosquitofish**, Amber Raven; Raelynn Deaton Haynes, St. Edward's University
- 1:45 009.041 U **Testing the Novelty Hypothesis as an explanation of heterospecific mating in livebearing fishes**, Dylan J Wichman; Raelynn Deaton Haynes, St. Edward's University
- 2:00 009.042 **Section Meeting**, Megan S Keith, South Plains College

**010. Poster Presentation and Judging for: Anthropology; Botany; Conservation Ecology; Environmental Science; Freshwater Science; Geosciences; Mathematics & Computer Science; Neuroscience; Physics & Eng; Science Education; Terrestrial Ecology & Management.**

2:30 to 4:00 pm

F. Marie Hall Building, Corridor A

Anthropology

Anthropology Poster Session

Participants:

- 010.043 G **Human skeletal evidence: Perspectives for narcotrafficking group identifications through modus operandi from the medico-legal department in Heredia, Costa Rica**, Kashmiere Nicole McGee, Texas Tech University; Paola Prada, TTU
- 010.044 G **Perception and nocturnal primate face masks**, Cody J Moser, Department of Anthropology, Texas A&M University; Gül A. Russell, Department of Humanities in Medicine, Health Science Center, Texas A&M University College of Medicine
- 010.045 U **Precision in 3D Prints: The case of MH1 (*Australopithecus sediba*)**, Lauren J. Hammond, Texas A&M University; Kersten Bergstrom, Texas A&M University; Robert Zac Selden, Stephen F. Austin State University; Darryl J. de Ruiter, Department of Anthropology, Texas A&M University
- 010.046 G **Taphonomic and fossil reconstructive analyses of the Ngaloba (LH 18) skull**, Kersten Bergstrom, Texas A&M University; Lauren Butaric, Des Moines University; Agness Gidna, National Museum of Tanzania; Charles Musiba, University of Colorado Denver; Robert Zac Selden, Stephen F. Austin State University; Cassian Magori, St. Francis University College of Health and Allied Sciences

Botany

Botany Poster Session

Participants:

- 010.047 U **Effects of increased UV light on monoterpenes in *Mentha peperita* L.**, Joshua Rios, St. Edward's University
- 010.048 U **Molecular Identification of the 18S rDNA for *Chlorococcum Microalgae C. lacustre* and *C. macrostigmatum***, Joanne Elise Thomson; Kathleen Wood, University of Mary Hardin-Baylor
- 010.049 U **Progress on the vascular flora of the Runningwater Conservancy, Hale County, TX.**, Krista Shay Epley, Wayland Baptist University; Matthew S Allen, Wayland Baptist University
- 010.050 U **The effects of norflurazon treatment on photosynthesis rate and  $\beta$ -carotene concentration in wheat and corn**, Mary Margaret Hillery, St. Edward's University; Jeremiah Grider, St. Edward's University

Conservation Ecology

Conservation Ecology Poster Session

Participants:

- 010.051 N **American Eel: Utilizing modern techniques to assess conservation status in Texas**, Melissa Casarez, University of Texas at Austin; Stephen Curtis, TPWD; Dean A. Hendrickson; Adam E. Cohen, University of Texas at Austin; Kevin Mayes, Texas Parks and Wildlife; Gary Garrett; F. Douglas Martin, University of Texas at Austin
- 010.052 U **Chemosensory signaling: behavioral interactions on interspecific competition between Gray Fox (*Urocyon cinereoargenteus*) and Red Fox (*Vulpes vulpes*)**, Michaela Elizabeth Gephart; Dejah Braxton; Rachel Dugan; Jesyka Lee; Wendi K Wolfram, Hardin-Simmons University
- 010.053 G **Chemosensory signaling: Deterrent for livestock predation and support for grassland conservation**, Hannah Stouffer; Wendi K Wolfram, Hardin-Simmons University
- 010.054 G **Effects of Red Imported Fire Ants on arthropod community associated with Green-flowered Milkweed plants occupied by Monarch Butterfly eggs and larvae.**, Kalynn Hudman, Texas A&M University - Commerce; Howard Crenshaw, Texas Parks and Wildlife Department; Jeremy Mayhew, Texas Parks and Wildlife Department; Jeff Kopachena, Texas A&M University- Commerce
- 010.055 G **Fall survival of monarch butterfly (*Danaus plexippus*) eggs and larvae in northeast Texas**, Alyx Rebecca Scott; Jeff Kopachena, Texas A&M University - Commerce
- 010.056 N **Gauging trends in public interest in conservation issues in Texas and adjacent states: An exploratory analysis using Google Trends data**, Rick L Hammer, Hardin-Simmons University

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010.057 G **Influence of arthropod community structure on the survival of Monarch Butterfly (*Danaus plexippus*) eggs and larvae in northeast Texas**, Misty Nixon, Texas A&M University-Commerce; Howard Crenshaw, Texas Parks and Wildlife Department; Jeremy Mayhew, Texas Parks and Wildlife Department; Jeff Kopachena, Texas A&M University - Commerce

010.058 G **Influence of the green-flowered milkweed (*Asclepias viridis*) health and quality on monarch butterfly (*Danaus plexippus*) larval survivorship**, Kelsey Helgerson, Texas A&M University-Commerce; Howard Crenshaw, Texas Parks and Wildlife Department; Jeremy Mayhew, Texas Parks and Wildlife Department; Jeff Kopachena, Texas A&M University - Commerce

010.059 U **Predicting the distribution of seagrass habitat along the Texas Gulf Coast using Maxent**, Rachel Bittner; Elizabeth L Roesler; Matthew A Barnes, Texas Tech University

010.060 U **The effects of ant relationships on Texas Horned Lizard populations**, Corrender Taylor; Samuel Thompson; J. D. Carnes; Wendi K Wolfram; Allan J. Landwer; Andrea B. Jensen, Hardin Simmons University

010.061 U **The effects of the reintroduction of native grasses on native bird populations in West Texas**, Francisco Alberto Velasco; Bryson Holcomb; Corrender Taylor; Wendi K Wolfram, Hardin-Simmons University

010.062 G **The Kisatchie Painted Crayfish (*Orconectes maletae*) status in Louisiana**, Jade Lynn Marie McCarley; Josh Banta; Kate Hertweck; John S. Placyk, Jr; Marsha G. Williams; Lance R. Williams, Department of Biology at the University of Texas at Tyler

Environmental Science

Environmental Science Poster Session

Participants:

010.063 U **Animal movement through Southwestern's EcoLab**, Zane McDurham, Southwestern University

010.064 U **Mammal trap efficiency verified with trail cameras**, Danielle D Cain, Schreiner University; Chris Distel, Schreiner University

010.065 U **Roadside edge effects on herbaceous plant communities**, My Nguyen, Concordia University Texas; Vincent Sherman, Concordia University Texas; Hailey Rafferty, Concordia University Texas; Rikki Ray, Concordia University Texas; Mary Kay Johnston, Concordia University Texas

010.066 U **The effects of water quality from natural and man-made resources on wildlife and livestock**, Elizabeth Lopez; Abbie Housden; Brittney Poor;

Kassidy Hooper; Wendi K Wolfram, Hardin-Simmons University

010.067 N **The Texas Ozonesonde Network**, Mark Garling Spychala, St. Edward's University; Gary A. Morris, St. Edward's University; Paul Walter, St. Edward's University

Freshwater Science

Freshwater Science Poster Session

Participants:

010.068 U **Comparison of gut microbiomes between native and invasive viviparids (*Gastropoda*, *Viviparidae*)**, Ernest North; Russell Minton, University of Houston Clear Lake

010.069 U **Investigating whether freshwater amphipods discriminate between quality and quantity for habitat preference**, Fiorella Hernandez, St. Edward's University

010.070 U **The effect of alternative mating on sperm competition in coercive livebearing fish**, Briana Martinez; Raelynn Deaton Haynes, St. Edward's University

Geosciences

Geosciences Poster Session

Participants:

010.071 U **Analyzing LiDAR slope data to create geologic maps**, Joshua Adam Reinhart; Tim Walsh, Wayland Baptist University

010.072 N **Dust emissions from saltation bombardment of salt efflorescences**, Robert Scott Van Pelt, USDA Agricultural Research Service; Guoming Zhang, Beijing Normal University

010.073 N **Geochemical variation in spring chemistry as evidence for a mixed fluid aquifer; Fort Hood Military Installation, Texas**, Kaleb J. Henry; Mindy Faulkner, Stephen F Austin State University

010.074 G **Petrographic and micro-facies analyses of the Fort Terrett Formation of the Lower Cretaceous Edwards Group, In Kimble County, Texas**, Richard Urwin, Stephen F. Austin State University

010.075 G **Petrographic and stratigraphic analysis along the Lower Cretaceous strata, in Kimble county Texas**, Austin C Wilkerson, Stephen F. Austin State University

010.076 G **Regional stress regime study of East Texas using orientation of fractures in the Weches Formation**, Cory Dean Ellison, Chris Barker, Stephen F. Austin State University

Mathematics and Computer Science

Mathematics & Computer Science Poster Session

Participants:

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010.077 U **Modeling trends for Texas traffic accidents**, *Victoria Gore, Southwestern University*

010.078 U **The impact of accommodated vehicle to vehicle communication**, *Dominic Carrillo, Sul Ross State University*

Neuroscience

Neuroscience Poster Session

Participants:

010.079 U **Cerebral hemodynamic effects of transcranial infrared laser stimulation measured with functional near-infrared spectroscopy**, *Emma Holmes; Douglas W. Barrett; F. Gonzalez-Lima, The University of Texas at Austin*

010.080 G **Cytokine concentration changes in selected brain regions of adjuvant-induced Rheumatoid Arthritis Lewis Rats**, *Han Yang; Amelia J. Stinson; Carlos A. Garcia, University of the Incarnate Word*

010.081 U **Determination of expression of *c16orf52* homologs**, *Emily Caroline Camara, University of Texas at Tyler; Brent R Bill, University of Texas at Tyler*

010.082 G **Enhanced expression of fragile X mental retardation protein in malformative lesions of patients with focal cortical dysplasia**, *Conner Douglas Reynolds, University of North Texas Health Science Center; Suzanne O Nolan, Baylor University; Gregory D Smith, Baylor University; Taylor Jefferson, Baylor University; Samantha Hodges, Baylor University; Joaquin N Lugo, Baylor University*

010.083 U **Generating a *grin1a* mutation in Zebrafish**, *Sahir Burkie; Brent R Bill, University of Texas at Tyler*

Physics and Engineering

Physics & Engineering Poster Session

Participants:

010.084 U **Conductivity of  $CsH_2PO_4$  and  $SiO_2$  composites under ambient and humid conditions over time**, *Sonam Lhamo, Andrea Montgomery, Israel Martinez, Alex Price, Cristian Botez, University of Texas at El Paso*

010.085 U **Creating a wave-powered robot**, *Christine Nissen, Southwestern University*

010.086 G **Stabilization over time of  $CsH_2PO_4$  conductivity by using propyl sulfonic acid functionalized silica under ambient and humid conditions.**, *Israel Martinez; Cristian Botez; Alex Price; Andrea Montgomery; Sonam Lhamo, University of Texas at El Paso*

010.087 G **The inverse and direct Hofmeister series of Hen egg lysozyme at pH below isoelectric point (pI) as seen by SAXS**, *Pawan Koirala; Jose L. Banauelos, University of Texas at El Paso*

Science Education

Science Education Poster Session

Participants:

010.088 U **Enhancing understanding of essential organic nomenclature for second semester general chemistry students**, *Cassandra Orozco, University of Texas at El Paso; James E. Becvar, University of Texas at El Paso; Mahesh Narayan, University of Texas at El Paso*

010.089 G **Inquiry science teaching professional development course for Biology graduate students**, *Ykevaa Tyree-Khari Hunt; Julie F. Westerlund, Texas State University*

010.090 **Workbooks enhance learning in peer-facilitated instruction**, *Alejandra Belmont; Ashley Priego; Ashley Baker; Mark Smith; Mahesh Narayan.; Geoffrey Saupe; James E. Becvar, University of Texas at El Paso*

Terrestrial Ecology and Management

Terrestrial Ecology Poster Session

Participants:

010.091 U **Activity patterns of White-tail Deer (*Odocoileus virginianus*) in an urban ecosystem**, *Lindsey Settles, East Texas Baptist University, Troy A Ladine, East Texas Baptist University*

010.092 N **A preliminary examination of the insect biodiversity in the Headwaters Sanctuary**, *David Starkey, University of the Incarnate Word*

010.093 N **Characterization of the bacterial flora of Sorcerer's Cave, the deepest cave in Texas**, *Joshua M. Brokaw; Hannah Seah; Samantha N. Studvick; Diana P. Desai, Abilene Christian University*

010.094 U **Effects of *Melanaphis sacchari* (Hemiptera: Aphididae) on the development and growth rate of *Coleomegilla maculata* (Coleoptera: Coccinellidae)**, *Brad Burden; Laura Weiser Erlandson, Texas A&M University - Central Texas*

010.095 N **Feeding rates of natural enemies on the sugarcane aphid, *Melanaphis sacchari* (Hemiptera: Aphididae)**, *Laura Weiser Erlandson; Brad Burden; Kaitlyn Liane Clark, Texas A&M University - Central Texas*

010.096 G **Life history of the perforate dome, *Ventridens demissus* (Gastropoda: Zonitidae)**, *Adrian Medellin, University of Houston Clear Lake; Russell Minton, University of Houston Clear Lake*

010.097 U **Loggerhead Shrike predation**, *Morgan Seiler, Sul Ross State University; Sean Graham, Sul Ross State University*

010.098 U **Preliminary colony density estimates and spatial analyses of harvester ants at Rolling N LLP properties, Runnels County, Texas**, *Alexis Skiles;*

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*Alyssa Brooks, Hardin-Simmons University; Kenneth Davis, Oregon Institute of Technology; Rick L Hammer, Hardin-Simmons University; Andrea B. Jensen, Hardin-Simmons University*

010.099 U **Relationship between plant biodiversity and soil type at the Texas A&M University – Central Texas campus**, *Tara Nawrocki; Laura Weiser Erlandson, Texas A&M University - Central Texas*

010.100 U **Significance of eBird as a predictive migratory tool on wild hummingbird migration**, *Ashley Michaela Rea, Schreiner University*

010.101 G **Testing dark spot affinity of bee flies (Diptera: Bombyliidae) using a novel pan trapping method**, *Lauren G Garrett; Chris M Ritzi, Sul Ross State University*

010.102 U **The effects of dispersal and nitrogen fertilizer on leaf litter arthropod communities**, *Kendall Nicole Terry-Stewart; Jordan Davis; Rebecca Navarro; Courtney Jones; Mary Kay Johnston, Concordia University Texas*

010.103 U **The link between larval cannibalism in *Chrysoperla rufilabris* and egg stalk length**, *Kaitlyn Liane Clark; Laura Weiser Erlandson, Texas A&M University - Central Texas*

010.104 N **The sawflies of Texas with an account of world grass feeders**, *Richard James Wilson Patrock, TAMUK*

010.105 U **Total cholesterol and triglyceride influence on Siphonaptera abundance in *Neotoma micropus* (the Southern Plains Woodrat)**, *Clarence Sparks; Diana Garcia Garcia, Midland College; Missy Schenkman, Sul Ross State University; Joseph Schenkman, Midland College; Chris M Ritzi, Sul Ross State University*

010.106 U **Track-tube assessment of a small mammal population in an urban ecosystem**, *Austin Word; Benjamin Dyess; Troy A Ladine, East Texas Baptist University*

**011. Cell and Molecular Biology Oral Session & Section Meeting**

4:00 to 6:00 pm

Marie Hall Building, 202

Cell and Molecular Biology

Cell and Molecular Biology Oral Session & Section Meeting

Chair: **Stephanie Perez**, *Texas Lutheran University*

Participants:

4:00 011.107 U **A bioinformatic approach to identify potential vaccine targets against the southern cattle tick**, *Rhipicephalus microplus*, *Caley Thomasson; Charles Hauser, St. Edward's University; Adalberto Perez De Leon, U.S. Department of Agriculture; Felix Guerrero, U.S. Department of Agriculture*

4:15 011.108 U **Differential gene expression in *C. reinhardtii* after exposure to cerium nanoparticles**, *Analise Roth, St. Edward's University*

4:30 011.109 U **Differential mechanism of action of 3,4',7-O-trimethylquercetin on three types of ovarian cancer cells**, *A H M Zuberi Ashraf; Laura Weiser Erlandson, Texas A&M University - Central Texas; Nasir Uddin, TAMHSC*

4:45 011.110 N **Effects of Hypoxia exposure on global DNA methylation in Brown Shrimp**, *MD Saydur Rahman, University of Texas Rio Grande*

5:00 011.111 G **The effect of induced aestivation on the immunocompetence system in *Scaphiopus couchii* found in southwest Texas**, *Alexandria-Jade Martinez Roberts; Sean Graham, Sul Ross State University*

5:15 011.112 **Section Meeting**, *Stephanie Perez, Texas Lutheran University*

**012. Chemistry & Biochemistry Oral Session 2**

4:00 to 6:00 pm

F. Marie Hall Building, Room 101

Chemistry and Biochemistry

Chemistry & Biochemistry Oral Session 2

Chair: **Adrian L Zapata**, *Schreiner University*

Participants:

4:00 012.113 U **Cactus Mucilage nongelling extract as a descalant in water**, *Abraham Fausto Jornada Cooper, Howard Payne University*

4:15 012.114 U **Cation exchange capacity determination: Comparison of three different methods**, *Lillie Alexandra Zech; Alyx S. Frantzen, Stephen F. Austin State University*

4:30 012.115 G **CEC determination of alkyl ammonium exchanged smectite clays using combustion methods**, *Celeste Keith, 1994; Alyx S. Frantzen, Stephen F. Austin State University*

4:45 012.116 U **Cactus Mucilage effects on produced water**, *Richard Treviso, Howard Payne University*

5:00 012.117 U **Latent fingerprint development: Mechanistic study of DFO and serine using DFT**, *Alaina Spurr; Brian Barngrover, Stephen F. Austin State University*

5:15 012.118 G **Photothermal absorbance detector for liquid chromatography**, *Bikash Chouhan; Purnendu K. Dasgupta, University of Texas Arlington*

5:30 012.119 G **Synthesis and characterization of biodiesel fuels via transesterification of triglycerides with furfuryl alcohol**, *Amanda Lynn Raley, Stephen F. Austin State University*

5:45 012.120 U **Theoretical mechanistic study of latent fingerprint development using 1,2-indanedione and serine**, *T. Russell Stager; Brian Barngrover, Stephen F. Austin State University*

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**013. Geosciences Oral Session 2 & Section Meeting**

4:00 to 6:00 pm

F. Marie Hall Building, 105

Geosciences

Geosciences Oral Session 2 & Section Meeting

Chair: **Russell LaRell Nielson**, *Stephen F. Austin State University*

Participants:

- 4:00 013.121 G **The application of ZooMS to North American faunal material**, *Erin M Keenan Early, Jackson School of Geosciences, University of Texas at Austin*
- 4:15 013.122 N **Integrated geophysical characterization of Karst related geohazards along Ranch to Market 652**, *Wesley Augustus Brown; Kevin W. Stafford, Stephen F. Austin State University*
- 4:30 013.123 N **Status of excavation of the middle Eocene WU-26 micro-mammal fauna from the Uinta Formation in the Uinta Basin**, *James Westgate, Lamar University*
- 4:45 013.124 U **Geochemical and petrographic characterization of Chert workability**, *Joshua Cyrus Wynn; Tim Walsh, Wayland Baptist University*
- 5:00 013.125 **Section Meeting**, *Russell LaRell Nielson, Stephen F. Austin State University*

**014. Physics and Engineering Oral Session & Section Meeting**

4:00 to 6:00 pm

F. Marie Hall Building, 107

Physics and Engineering

Physics and Engineering Oral Session & Section Meeting

Chair: **Kim Arvidsson**, *Schreiner University*

Participants:

- 4:00 014.126 U **Comparing the number of Radio Loud Quasars with high velocity H $\beta$  line widths to total number of Quasars**, *Miranda Brooke Gilbert, Sul Ross State University*
- 4:15 014.127 U **Development of instrumentation and metrology for low magnetic field bio-imaging**, *Susana Beltran, Southwestern University; Joshua Biller, National Institute of Standards and Technology, Magnetic Imaging Group; Karl Stupic, National Institute of Standards and Technology, Magnetic Imaging Group*
- 4:30 014.128 U **Effects of nickel, multi-walled carbon nanotubes, and multi-walled carbon nanotubes/nickel nanoparticles on power production and wastewater treatment of microbial fuel cells**, *Diana Beltran, Southwestern University; Jia Liu, Southern Illinois University Carbondale*
- 4:45 014.129 N **Physical and thermal properties of modern stabilized Adobe**, *Gerald Mulvey; Sreedevi J. Ande, University of the Incarnate Word*

5:00 014.130 N **Visualizing hydrogen molecular wavefunctions using Monte Carlo methods**, *Steve Alexander, Southwestern University; R.L. Coldwell, University of Florida*

5:15 014.131 U **Visualizing non-linear dynamical systems in virtual reality (VR)**, *Bryan Hollingsworth, Southwestern University*

5:30 014.132 **Session Meeting**, *Kim Arvidsson, Schreiner University*

**015. Science Education Oral Session 1**

4:00 to 6:00 pm

F. Marie Hall Building, 201

Science Education

Science Education Oral Session 1

Chair: **Stephanie Ann Garcia**, *The University of Texas at San Antonio*

Participants:

- 4:00 015.133 N **A case-based approach to teaching evolutionary biology**, *Raelynn Deaton Haynes, St. Edward's University*
- 4:15 015.134 G **An exploration of an informal robotics / art program in a children's STEAM museum**, *Sarah Harris, University of Texas at Austin*
- 4:30 015.135 U **Assessing elementary pre-service teachers' science content knowledge and teaching efficacy**, *Mamta Singh, Lamar University*
- 4:45 015.136 G **Exploring Latino parent attitudes toward and involvement in Science**, *Izzy De Leon; Julie F. Westerlund, Texas State University*
- 5:00 015.137 N **Outcomes from a teaching module for how science works aimed at college students**, *Rebecca M Price, University of Washington Bothell; Kathryn Elizabeth Perez, University of Texas Rio Grande Valley*
- 5:15 015.138 N **Sustaining student facilitated learning via a workbook: ending the cycle of grant dependency**, *James E. Becvar; Geoffrey Saupe; Juan Noveron; Mahesh Narayan, University of Texas at El Paso*
- 5:30 015.139 N **Maximizing STEM learning in microbiology laboratory through bacterial enumeration**, *Joni H Ylostalo, University of Mary Hardin-Baylor*

**016. Terrestrial Ecology & Management Oral Session 1**

4:00 to 6:00 pm

F. Marie Hall Building, 203

Terrestrial Ecology and Management

Terrestrial Ecology & Management Oral Session 1

Chair: **Richard Patrock**, *TAMUK*

Participants:

- 4:00 016.140 U **Assessing the dendroclimatological potential of juniper tree-rings in Palo Duro and Caprock Canyons, TX**, *Chelsea Beaubouef; Matthew S Allen, Wayland Baptist University*

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- 4:15 016.141 G **Blood hormone and lipid level correlation to the quantity of ectoparasites present on the Southern Plains Woodrat (*Neotoma micropus*)**, Missy Schenkman, Sul Ross State University; Joseph Schenkman, Midland College; Clarence Sparks, Midland College; Diana Garcia Garcia, Midland College; Chris M Ritzi, Sul Ross State University
- 4:30 016.142 U **Comparison of two non-toxic particle films for control of Juvenile Lone Star Ticks (*Amblyomma americanum*)**, Eduardo Munoz, Schreiner University; Allan Showler, USDA Agricultural Research Service; Weste Osbrink, USDA Agricultural Research Service; Ryan Matthew Caesar, Schreiner University
- 4:45 016.143 G **Does consumption of different prey influence epidermal lipids in snake skin?: A quantitative and qualitative analysis**, John Michael Weidler, Sam Houston State University
- 5:00 016.144 U **Effects of burrowing prairie crayfish on soil nutrients and microbial communities**, Tara Nawrocki, Texas A&M University - Central Texas; Harold P. Collins, USDA-ARS; Philip Fay, USDA-ARS; Wayne Polley, USDA-ARS
- 5:15 016.145 N **Beetles, Weevils, and Scales, Oh My! Monitoring of three biocontrols for salt cedar in the Trans-Pecos Texas and Southeast New Mexico**, Chris M Ritzi; Alexandra M Hassenflu, Sul Ross State University
- 5:30 016.146 U **Habitat associations and population estimates for the Texas Horned Lizard (*Phrynosoma cornutum*) in the Texas Panhandle**, Sara van der Leek; Andrew Kasner, Wayland Baptist University
- 5:45 016.147 **Section Meeting**, Richard Patrock, TAMUK

**Creating a bioavailable baseline for understanding ancient human mobility**, Paloma Cuello del Pozo, Texas A&M University College Station

- 8:15 018.149 **Section Meeting**, Robert Zac Selden, Stephen F. Austin State University

**019. Biomedical Sciences Oral Session & Section Meeting**

8:00 to 10:00 am

F. Marie Hall Building, 105

Biomedical Sciences

Biomedical Sciences Oral Session & Section Meeting

Chair: **Joni H Ylostalo**, University of Mary Hardin-Baylor

Participants:

- 8:00 019.150 U **Assessment of endocrine disrupting compounds among children through the analysis of Bisphenol A in milk.**, Angela Marisol Encerrado, student; Wen-Yee Lee, University of Texas at El Paso
- 8:15 019.151 G **Associations of obesity and lifestyle factors between children in rural and urban areas in West Texas**, Cassandra Hernandez; Chris M Ritzi, Sul Ross State University
- 8:30 019.152 U **Dermatophyte susceptibility to Gentian Violet**, Debbie Steinert Brannon, University of Texas of the Permian Basin
- 8:45 019.153 U **Effects of imidacloprid on physiological and neurological functions of the non-target organisms *Caenorhabditis elegans* and *Hyalella azteca***, Mayra Levario, St. Edward's University
- 9:00 019.154 N **Persistent organic pollutants (POPs) residues in human milk**, Mohamed Hamza EL-Saeid, Prof. Chem @ Environmental Pollution, King Saud Univ.
- 9:15 019.155 **Section Meeting**, Joni H Ylostalo, University of Mary Hardin-Baylor

**020. Chemistry & Biochemistry Oral Session 3 & Section Meeting**

8:00 to 10:00 am

F. Marie Hall Building, Room 101

Chemistry and Biochemistry

Chemistry & Biochemistry Oral Session 3 & Section Meeting

Chair: **Adrian L Zapata**, Schreiner University

Participants:

- 8:00 020.156 N **Classic physical chemistry experiments: They ain't broke but we're fixin' 'em anyway**, Alyx S. Frantzen, Stephen F. Austin State University
- 8:15 020.157 G **Evolved-gas analysis of the pre-ignition stage of a fire of invasive plants of East Texas with STA-IR**, Antonio David Trevino; Alyx S. Frantzen, Stephen F. Austin State University
- 8:30 020.158 G **Identification of products of redox reacted dialkyl polysulfides**, Indika Kasun Warnakula, Marton Kiss, Christian Thomas Rios, Marissa Vergara, Miss, Ramesha D. Gaspe Ralalage, Ashley Christine

**Saturday, March 3**

**017. Past Presidents Breakfast**

7:00 to 8:00 am

Jack E. Brown Dining Hall, Foundation Room

**018. Anthropology Oral Session & Section Meeting**

8:00 to 10:00 am

F. Marie Hall Building, 107

Anthropology

Anthropology Oral Session & Section Meeting

Chair: **Robert Zac Selden**, Stephen F. Austin State University

Participants:

- 8:00 018.148 G **Preliminary analysis of 87Sr/86Sr ratios from organisms on Lanzarote, Canary Islands:**

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- Whiteman, Ilona Petrikovics, Sam Houston State University*
- 8:45 020.159 U **Optimizing the RSIT value technique for invasive plant species**, *Sydney Thompson; Alyx S. Frantzen, Stephen F. Austin State University*
- 9:00 020.160 U **Prolonging the time of fluorescence for Cy3-alkyne and Cy5-alkyne using ROXS**, *Mauro A. Garcia; Ian Orantes-Orellana; Lauren Gillespie; David Cooper, Southwestern University*
- 9:15 020.161 U **Protein corona formation: Investigating the effects of cell culture growth media on nanoparticle size, stability, and net charge**, *Yelixza Idalyss Avila, Sul Ross State University; Denise Perry Simmons; Mohammad A. Omary, University of North Texas*
- 9:30 020.162 N **Students productively using phones: Improving the chemistry classroom through augmented reality**, *Brian Barngrover, Stephen F. Austin State University*
- 9:45 020.163 **Section Meeting**, *Adrian L Zapata, Schreiner University*
- 021. Marine Science Oral Session & Section Meeting**  
8:00 to 10:00 am  
*F. Marie Hall Building, 202*  
Marine Science  
Marine Science Oral Session & Section Meeting  
*Chair: Joseph Lawrence Kowalski, The University of Texas Rio Grande Valley*  
Participants:
- 8:00 021.164 G **Effects of high temperature on ovarian functions and heat shock protein expression in Atlantic Sea Urchin**, *Jackson Brooks Johnstone; Sarah Nash; Mario Molino, University of Texas Rio Grande Valley, Department of Marine Sciences; MD Saydur Rahman, University of Texas Rio Grande*
- 8:15 021.165 U **Habitat Preference of the Gulf Toadfish *Opsanus beta***, *Claire Adams, St. Edward's University*
- 8:30 021.166 U **Prevalence and intensity of Aspergillosis on *Gorgonia ventalina* and *G. flabellum* on the Mesoamerican Barrier Reef, Roatán, Honduras**, *Austin Ryan Biddy, Texas Tech University - Waco*
- 8:45 021.167 **Section Meeting**, *Joseph Lawrence Kowalski, The University of Texas Rio Grande Valley*
- 022. Mathematics & Computer Science Oral Session & Section Meeting**  
8:00 to 10:00 am  
*F. Marie Hall Building, 209*  
Mathematics and Computer Science  
Mathematics & Computer Science Oral Session & Section Meeting  
*Chair: Prudence York-Hammons, Temple College*  
Participants:
- 8:00 022.168 U **Determining solvability of entanglements**
- by connector loop orientations**, *Kyle Rickman, Wayland Baptist University*
- 8:15 022.169 U **When two is better than one: Entrainment of the Fruit Fly Circadian Clock by light and temperature**, *Jacob Lee Woytek, Schreiner University; Kevin M. Hannay, Schreiner University*
- 8:30 022.170 **Section Meeting**, *Prudence York-Hammons, Temple College*
- 023. Science Education Oral Session 2 & Section Meeting**  
8:00 to 10:00 am  
*F. Marie Hall Building, 201*  
Science Education  
Science Education Oral Session 2 & Section Meeting  
*Chair: Stephanie Ann Garcia, The University of Texas at San Antonio*  
Participants:
- 8:00 023.171 N **Making small open tubular liquid and ion chromatographs for Terra Firma and beyond**, *Purnendu K. Dasgupta, University of Texas Arlington*
- 8:15 023.172 G **The black and white of dye color and fluorescence: A simple teaching demonstration**, *Laura I Saucedo; Keith H. Pannell, University of Texas at El Paso*
- 8:30 023.173 G **Transforming science education to increase interdisciplinarity and relevancy**, *Stephanie Ann Garcia, The University of Texas at San Antonio*
- 8:45 023.174 N **The position of nature of science (NOS) in teacher preparation programs in Texas**, *Patricia Ramirez; Jair Aguilar; Noushin Nouri, The University of Texas Rio Grande Valley*
- 9:00 023.175 N **The impact of a 15 hours workshop on Hispanic preservice teachers' attitudes and beliefs toward teaching science**, *Jair Aguilar; Noushin Nouri; Patricia Ramirez, The University of Texas Rio Grande Valley*
- 9:15 023.176 **Section Meeting**, *Stephanie Ann Garcia, The University of Texas at San Antonio*
- 024. Terrestrial Ecology & Management Oral Session 2 & Section Meeting**  
8:00 to 10:00 am  
*F. Marie Hall Building, 203*  
Terrestrial Ecology and Management  
Terrestrial Ecology & Management Oral Session 2 & Section Meeting  
*Chair: Richard Patrock, TAMUK*  
Participants:
- 8:00 024.177 U **How citizen science augments our understanding of Texas amphibian natural history**, *Julianne Dewar; Travis J LaDuc, University of Texas at Austin*
- 8:15 024.178 G **Insect pollinator diversity and other associates of Salt Cedar (*Tamarix* sp) along the Rio Grande in Presidio County, Texas**, *Alexandra M*

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- Hassenflu; Chris M Ritzi, Sul Ross State University*
- 8:30 024.179 U **Post-Burn analysis of insect diversity at the Chihuahuan Desert Research Institute, Jeff Davis County, Texas**, *Katherine Marie Lee Mancha; Chris M Ritzi, Sul Ross State University*
- 8:45 024.180 G **Preliminary analysis of habitat use of sympatric rattlesnakes in West Texas**, *Jaimie Michelle Lawhorn; Sean Graham, Sul Ross State University*
- 9:00 024.181 N **Ticks on toads: first report of exotic ticks (*Amblyomma rotundatum*) parasitizing invasive cane toads (*Rhinella marina*) in Hawaii**, *Crystal Kelehear, Sul Ross State University; Cameron Hudson, University of Sydney; James Mertins, USDA - APHIS; Richard Shine, University of Sydney*
- 9:15 024.182 **Section Meeting**, *Richard Patrock, TAMUK*

**025. Poster Presentation and Judging for: Biomedical; Cell & Molecular Biology; Chemistry & Biochemistry; Marine Science; Systematics & Evolutionary Biology.**

10:00 am to 12:00 pm

*F. Marie Hall Building, Corridor B*

Biomedical Sciences

Biomedical Sciences Poster Session

Participants:

025.183 U **A hybrid regulator in the TetR family with predictable properties in DNA-binding and allosteric response**, *Ben Jordan; Rey Preston Dimas; Clement Chan, University of Texas at Tyler*

025.184 U **Antibacterial effects of organic plant extracts**, *Marlynn Cadena; Homero Ivan Dominguez; Delfina Dominguez; Rachid Skouta; Carlos Valenzuela, University of Texas at El Paso*

025.185 U **Counteracting the negative effects of Imidacloprid using autophagy-inducing mechanisms**, *Astrid Romero, St. Edwards University; Garrett Taurus, School of Natural Sciences*

025.186 U **Cytokine profiling of pre-clinical and clinical cancer studies**, *Valerie Gallegos; Armando Estrada; Valeria Rolih; Paloma Valenzuela; Karla Parra; Georgialina Rodriguez, Marian Manciu, Giulio Francia, Robert Kirken, University of Texas at El Paso*

025.187 U **Heat's role as a mechanism of dynamic stretching**, *Matthew Boineau, Concordia University Texas; Rachel Boice, Concordia University Texas; Cory Smith, Concordia University Texas; Mary Kay Johnston, Concordia University Texas*

025.188 U **Reducing some physiological stress effects by exercising**, *Caleb Austin Maddox, Concordia University Texas; Mary Kay Johnston, Concordia University Texas*

025.189 U **The discovery of novel inhibitors for *K. pneumoniae* Carbapenemase (KPC-2) using high-throughput virtual screening**, *Tu Nhat Nguyen,*

- University of Texas at Austin; Josh Beckham,*
- 025.190 U **Therapeutic organotin compounds against *Leishmania major* and *Trypanosoma cruzi***, *Itzel Amacalli Tejada, University of Texas at El Paso; Rosa Maldonado, University of Texas at El Paso; Keith Pannell, University of Texas at El Paso*
- 025.191 U **Toxicity of virus like particles in *Danio rerio***, *Olivia Gean Brandenburg, University of Texas at Tyler; Bridget A. Fitzgerald, University of Texas at Tyler; Brent R Bill, University of Texas at Tyler*
- 025.192 U **Virtual Screening for novel inhibitors of *Plasmodium vivax* 6-phosphogluconate dehydrogenase**, *Geovanny Antonio Zarceno, 1997; Josh Beckham, Walter Fast, University of Texas at Austin*

Cell and Molecular Biology

Cell & Molecular Biology Poster session

Participants:

025.193 U **Altered maintenance of hematopoietic cells by hydroquinone-treated S17 stromal cells**, *Joyce Nawara, Texas Lutheran University; Stephanie Perez, Texas Lutheran University*

025.194 G **Antimicrobial properties of moderate halophiles isolated from soil surrounding a hypersaline lake**, *Eduardo de la Garza, University of Texas Rio Grande Valley*

025.195 U **Characterization of cancer hallmarks in PA28 $\gamma$ -/- cancer clones and A9 tumor cells**, *Estefany Zambrano; Bethany Bundrant; Lance Barton, Austin College*

025.196 U **Cytotoxicity of *Cinnamomum verum* (Cinnamon) and *Salvia officinalis* (Sage) in 4T1 Murine breast cancer cells.**, *Makayla Nicholson; Alana Quackenbush; Ethan Nicholson; Adam Reinhart; Robert L Moore; Gary O. Gray, Waylon Baptist University*

025.197 U **Detection of mutations in the sodium channel of *Rhipicephalus microplus* using High Resolution Melting Analysis**, *Ariel Delgado, University of Texas Rio Grande Valley; Guilherme Klafke, USDA-ARS Cattle Fever Tick Research Laboratory; Jason Tidwell, USDA ARS Cattle Fever Tick Research Facility; Robert John Miller, USDA-ARS Cattle Fever Tick Research Laboratory; Adalberto Perez De Leon, U.S. Department of Agriculture*

025.198 U **Evaluation of the breast epithelial cell line EpH4-Ev as a non-tumorigenic control to the 4T1 tumorigenic breast cancer cell line**, *Alana Quackenbush; Makayla Nicholson; Gary O. Gray; Adam Reinhart, Wayland Baptist University*

025.199 U **Identifying potential *Bacillus thuringiensis* candidates to control *Aethina tumida***, *Gilberto Vento, University of Texas Rio Grande Valley*



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025.200 U **Investigating the effects of p53 mutations on cancer phenotypes in transformed MEF cells**, *Janani Ramesh; Emily Bourcier, Austin College*

025.201 U **Investigating the role of PA28 $\gamma$  in NF $\kappa$ B-mediated inflammatory and cancer responses**, *Hannah Butterfield; Trung Nguyen; Emma Thornburg; Brian Nguyen, Austin College*

025.202 U **Pyruvate dehydrogenase complex related genes are differentially expressed between neonatal and adult cardiomyocytes**, *Emily L Ensley; Joni H Ylostalo, University of Mary Hardin-Baylor*

025.203 U **Regulatory mechanisms dictating the activity of post-translational modification systems in mammalian cells**, *Carlos Oscar Ontiveros; Arely Diaz; Germán Rosas-Acosta, The University of Texas at El Paso*

025.204 U **Seasonal variation of the Honey Bee honey stomach microbiome**, *A H M Zuberi Ashraf, Student; Laura Weiser Erlandson, Texas A&M University - Central Texas; Allyson K Martinez, TAMU*

025.205 U **Tumor growth monitoring of orthotopic colon cancer model**, *Jose Lopez; Giulio Francia, University of Texas at El Paso*

025.206 U **Using colocalization studies to explore potential interactions between the *Drosophila* proteins Kinesin, Dynactin and Eip63E**, *Kaitlin Beetner, Schreiner University; Kara Miller, Schreiner University; Susan Klinedinst, Schreiner University*

Marine Science

Marine Science Poster Session

Participants:

025.207 U **A methodological comparison of the Line Transect and the Randell-Robertson Marine Survey Technique**, *Grace Gonzalez, McLennan Community College - T.I.D.E.S Lab*

025.208 U **Annual reproductive cycle of Atlantic Sea Urchin in the Southern Gulf of Mexico**, *Eleazar Hernandez; Omar Vazquez; Andre Torruco; MD Saydur Rahman, University of Texas Rio Grande*

025.209 N **Association of Boring Organisms with Dark Spot Syndrome in Roatan, Honduras**, *Jennifer Novak, McLennan Community College - T.I.D.E.S Lab*

025.210 H **Community primary productivity patterns along a salinity gradient in the Lower Laguna Madre of Texas**, *Nicholas VanHee; Alejandro Vasquez; Paulina Ocadiz; Paulina Sanchez; Jessica Ayala; Alison McClellan, The International Baccalaureate Program at Lamar Academy; Hudson DeYoe; Joseph Lawrence Kowalski, The University of Texas Rio Grande Valley*

025.211 U **Comparison of analyses of ocean marine nutrients using commercial aquarium kits vs. established literature protocols**, *Micah Nathaniel*

*Bigby, Midland College*

025.212 U **Dermo presence in Lower Laguna Madre Oysters**, *Daniel Gonzalez, University of Texas Rio Grande Valley*

025.213 U **Development of a submersible sensor system for in-situ water quality measurements**, *Nicholas David Mastroianna, Midland College; Jeramy Lusk, Midland College; Greg Larson, Midland College; Brian Steven Flowers, Midland College*

025.214 H **Faunal diversity along a salinity gradient, Lower Laguna Madre, Texas**, *Jessica Ayala; Alison McClellan; Alejandro Vasquez; Nicholas VanHee; Paulina Ocadiz; Paulina Sanchez, The International Baccalaureate Program at Lamar Academy; Hudson DeYoe, The University of Texas Rio Grande Valley; Joseph Lawrence Kowalski, The University of Texas Rio Grande Valley*

025.215 U **Fish assemblages on the Mesoamerican Barrier Reef in Roatán, Honduras**, *Scheila Rene Corujo, Texas Tech University*

025.216 U **Gut content analysis of the Gulf Toadfish *Opsanus beta***, *Claire Adams, St. Edward's University*

025.217 U **Methodological comparison of the Line Transect and the Randell-Robertson Marine Survey technique**, *Brooke Allison, McLennan Community College TIDES Lab*

025.218 U **Preference of *Ctenogobius boleosoma* on habitats with and without sea grasses**, *Roberto Cesar Robles, Saint Edwards University*

025.219 U **Sea Fun Abundance and Frequency of *Millepora alcicornis* on the Mesoamerican Barrier Reef in Roatan Honduras**, *Shirley Rose Stewart, McLennan Community College*

025.220 H **Water quality of the tidal Arroyo Colorado of Texas along a salinity gradient.**, *Paulina Ocadiz; Paulina Sanchez; Jessica Ayala; Alison McClellan; Alejandro Vasquez; Nicholas VanHee, The International Baccalaureate Program at Lamar Academy; Hudson DeYoe; Joseph Lawrence Kowalski, The University of Texas Rio Grande Valley*

Systematics and Evolutionary Biology

Systematics & Evolutionary Biology Poster Session

Participants:

025.221 N **Development of new nuclear markers for phylogeny reconstruction in *Thomasomys* (Rodentia: Cricetidae)**, *Joshua M. Brokaw; Hannah Seah; John P Placide; Meagan R. Benson; Jonathan G. Jasper, Abilene Christian University*

025.222 U **Examination of Virgin/Non-Virgin *Gambusia affinis* mating latency in a crossed experiment.**, *Samuel Kenyon; Raelynn Deaton Haynes, St. Edward's University*

025.223 U **Morphological and behavioral predictors**

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Program Schedule

**of male dominance in *Gambusia affinis*, Ciara Crochet; Dylan J Wichman; Raelynn Deaton Haynes, St. Edward's University**

025.224 U **Preliminary insect biodiversity survey of Rolling N LLP properties, Runnels County, Texas**, Alyssa Brooks; Alexis Skiles; Andrea B. Jensen, Hardin Simmons University

025.225 U **Quantifying *Wolbachia* infection rates in Monarch and Queen Butterflies**, Kendall Wermine; Christian Williams; Rebecca Hunter, Abilene Christian University

Chemistry and Biochemistry

Chemistry & Biochemistry Poster Session

Participants:

025.226 U **Analysis of mineral ion content of potable water from the natural springs of maniton springs, colorado using inductively coupled plasma-mass spectroscopy**, Gilberto Gonzalez, University of The Incarnate Word; Abraham A. Williams, University of The Incarnate Word; Jason Gerding, University of The Incarnate Word; Alakananda R. Chaudhuri, University of The Incarnate Word; Edward E. Gonzalez, University of The Incarnate Word

025.227 U **A new silicon-metal complex that reveals unknown phosphine-metal chemistry**, Deidrah Carrillo; Renzo Arias; Alejandro Metta-Magaña; Hemant K. Sharma; Keith H. Pannell, University of Texas at El Paso

025.228 U **Beta-2-microglobulin mutations**, Mikayla Rose Gascich, Austin College

025.229 U **Characterization of Texas home distilled alcohol using gas chromatography and flame atomic absorption spectroscopy**, Linh Pham; Randy Alan Stoneroad II; John Grady Barber; Coady Lapierre, Texas A&M University - Central Texas

025.230 U **Chemical signaling in the phycosphere: Growth response of Chromists to bacterial signals and Phytohormones**, Daniela Hirsch; B. D. Leverett, University of the Incarnate Word

025.231 U **Construction of peptide-based molecular building blocks for the controlled assembly of nanomaterials**, Jessica Bird; Dustin Patterson; Sean C Butler, The University of Texas at Tyler

025.232 U **Design of laboratory experiences in material science for cooperative project-based experimentation in General Chemistry**, Corbin McCleary; Adrian Villalta-Cerdas, Sam Houston State University

025.233 U **Difference of tRNA gene distribution between three low-GC bacteria**, Gracia Sebastiao; Robert L Moore, Wayland Baptist University

025.234 U **Effect of *Trichoderma viride* volatile organic compounds on growth inhibition and**

**protein synthesis in *Neolentinus lepideus***, Elizabeth Nguyen; Mary A. Kopecki-Fjetland, St. Edward's University

025.235 G **Extraction and antimicrobial activity in three classes of microalgae**, Patrick Matulich; B. D. Leverett, University of the Incarnate Word

025.236 U **Gold (I) Catalyzed Synthesis of 1H-Isochromenes**, Saarah Cantu, Southwestern University

025.237 U **Green synthesis of a cross-linked polymerized hydrogel containing NDHGA-capped gold nanoparticles**, Elizabeth O Rugutt; Milka O Montes, University of Texas Permian Basin

025.238 G **Hydrogenation of CO<sub>2</sub> using bifunctional transition metal catalysts containing hydride-relay ligands**, Nilakshi Devi, Christopher M Zall, University of Texas Rio Grande Valley

025.239 U **Investigation of acetylation of  $\beta$ -2 microglobulin to trigger misfolding**, Robbie Moore, Austin College

025.240 U **Isolation of visible and fluorescent dyes from red cabbage for new applications**, Eric Yang; Thomas Edward Ready, Midland College

025.241 G **Lanthanide and actinide extractions using di(p-tert-butylphenyl)-N,N-di-(isobutyl)carbamoylmethylphosphine oxide substituted acetic acid**, Raul Alejandro Cuevas, Keith Pannell, University of Texas at El Paso

025.242 U **Modifying the HK97 virus-Like particle as a cargo delivery and protection system**, Michael King; Dustin Patterson, The University of Texas at Tyler

025.243 U **Phenolic composition and essential oil contents of 23 basil (*Ocimum basilicum* L.) cultivars**, Melanie S. Aing; Eunice M. Bajomo; Lucas S. Ford; Emily Niemeyer, Southwestern University

025.244 U **Photolytic cleavage of N-acyl-7-nitroindolines on nanoparticles and in metal organic frameworks**, Karen Liliana Castaneda, University of Texas El Paso

025.245 U **Preventing photobleaching in Cy5-alkyne systems**, Ian Orantes-Orellana, Southwestern University; David Cooper; Mauro A. Garcia; Lauren Gillespie, Southwestern University

025.246 U **Sequential encapsulation of enzymes within the P22 virus-like particles indicates maturation of an enzyme is important to obtaining optimal kinetic activity**, Christy Hjorth; Dustin Patterson, The University of Texas at Tyler

025.247 U **Study of the effects of titanium dioxide nanoparticles in the nitrogen cycle of *Favites* Pentagona Coral environment**, Melissa Wood; Milka O Montes, University of Texas Permian Basin

025.248 U **Synthesis of 1,4-Diketones with Low-**

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**Valent Titanium Species**, *Nathan Le, Southwestern University*

025.249 U **Synthesis of small organic molecule for near-infrared lasers**, *Payton J Nelson, Schreiner University*

025.250 U **The reduction of gold nanoparticle formation by *Lactobacillus acidophilus***, *Ezequiel Paz; Milka O Montes, University of Texas Permian Basin*

025.251 U **Using local GC percentage to detect unusual regions in bacterial genomes**, *Sharon Leigh Ann DeMerritt; Gracia Sebastiao; Robert L Moore, Wayland Baptist University*

025.252 U **Viability of API testing kit for ammonium measurement**, *Sonal V Jha, University of Texas Rio Grande Valley*

025.253 U **Virtual screening for novel inhibitors of *Trypanosoma cruzi* 6-phosphogluconate dehydrogenase**, *Kaan Kumru, University of Texas at Austin*

**026. Lunch**

12:00 to 1:15 pm

Carrasco Room, Scharbauer Student Center  
Texas Academy of Science Annual Meeting  
Lunch

**027. Graduate Competition Oral Session 1**

1:30 to 3:30 pm

Carrasco Room, Scharbauer Student Center  
Graduate Student Paper Competition  
Graduate Competition Oral Session

Participants:

1:30 027.254 G **Evaluating suitable habitat of invasive tilapia and forecasting hotspots for potential impacts on imperiled fishes of Texas**, *Elizabeth L Roesler, Texas Tech University; Monica McGarrity, Texas Parks and Wildlife Department; Matthew A Barnes, Texas Tech University*

1:42 027.255 G **Post-op bleeding in a patient with noonan syndrome and factor XIII deficiency: a case study**, *Tyler Jay Homewood, UNTHSC/TCOM*

1:54 027.256 G **Role of time in K9 narcotic training aids: Perspectives on working dog performance**, *Lauren Alejandro, Paola Prada, TTU.*

2:06 027.257 G **An implantable flow monitor for hydrocephalus**, *Chuchu Qin, University of Texas at Arlington; Purnendu K. Dasgupta, UT Arlington*

2:18 027.258 G **Triethylsilyloxymethyl-N-N-dimethylamine as a Mannich reagent: The varied chemistry with anilines**, *Anwar Jacintomoreno; Alejandro Metta-Magaña; Hemant K. Sharma; Keith H. Pannell, University of Texas at El Paso*

2:30 028.259 G **Detecting presence or absence of alternative splicing at the *superkdr* locus in horn fly, *Haematobia irritans***, *Gabriela Solis, Texas State*

*Univeristy*

2:42 028.260 G **Laser-Enhanced sustained attention and working memory in neurocognitive disorder**, *Celeste L. Saucedo; Courtney Alexander; Douglas W. Barrett; F. Gonzalez-Lima, The University of Texas at Austin*

2:54 028.261 G **Specimen dates and species longevity: an evaluation of temporal range data for questions of ancestry in the hominin fossil record**, *Timothy Lee Campbell, Department of Anthropology, Texas A&M University; Chris A. Robinson, Department of Biological Sciences, Bronx Community College; Susanne Cote, Department of Anthropology and Archaeology, University of Calgary; Darryl J. de Ruiter, Department of Anthropology, Texas A&M University*

3:06 028.262 G **Synthesis of biodiesel fuels via transesterification using acorn (*Quercus sp.*) as an alternative triglyceride source**, *Darean Bague, Stephen F. Austin State University; Russell J Franks, Ph.D., Stephen F. Austin State University*

3:18 028.263 G **The taxonomic and anatomical diversification of mosasaurs during the Late Cretaceous: a study system for understanding evolution in a greenhouse world**, *Joshua Ryan Lively, The University of Texas at Austin*

**029. Section Chairs Post Session Meeting**

3:30 to 3:45 pm

F. Marie Hall Building, Room 101  
Texas Academy of Science Annual Meeting  
Section Chairs Post Session Meeting

**030. TAS Business Meeting**

3:45 to 4:00 pm

Carrasco Room, Scharbauer Student Center  
Texas Academy of Science Annual Meeting  
TAS Business Meeting

**031. Texas Outstanding Educator Award and Lecture**

4:15 to 4:50 pm

Carrasco Room, Scharbauer Student Center

**032. Distinguished Texas Scientist Award and Lecture**

4:50 to 5:25 pm

Carrasco Room, Scharbauer Student Center

**033. Reception**

6:30 to 7:15 pm

CAF Main Hanger

**034. Awards Banquet**

7:15 to 9:30 pm

CAF Main Hanger

**Friday, March 2**

**003. Botany Oral Session & Section Meeting**

12:30 to 2:30 pm

Marie Hall Building, 201

Botany

Botany Oral Session & Section Meeting

Participants:

- 12:30 003.001 U **A pilot study: Bio-flocculation of *Chlorococcum* microalgae via fungal association**, Joanne Elise Thomson, University of Mary Hardin-Baylor; Kathleen Wood, University of Mary Hardin-Baylor  
Algal flocculation is a method used to separate algae from media for harvesting. Aggregation may be induced chemically using cations such as Zn<sup>2+</sup> or Al<sup>3+</sup>, by changing the culture conditions, by using biopolymers or through electrical/magnetic methods. It may also be induced biologically via bacteria, fungi or diatoms. During a previous experiment in our lab, spherical aggregations of *C. microstigmatum* were observed, leading us to investigate the source of flocculation, which appeared to be an unknown fungal contaminant. The purpose of this pilot study is to provide baseline data for future research by investigating bio-flocculation of *C. microstigmatum* with this fungus. Algae were purchased from the UTEX Culture Collection of Algae. Algal pre-cultures were grown on proteose freshwater 1.5% agar plates at room temperature and under continuous illumination. Fungal isolates along with algal samples were transferred to broth and agitated using an orbital shaker under continuous illumination for 7 days. Afterwards, spherical aggregations of *C. microstigmatum* were observed in the broth and then viewed under a light microscope. Genomic DNA was extracted from the unknown fungus and sequenced for identification.
- 12:45 003.002 G **Correlation of mescaline concentration in crown tissue samples of *Lophophora williamsii* (Cactaceae) with rib number**, Richard Paul Newbold, Sul Ross State University; Martin Kilman Terry, Sul Ross State University  
A phytochemical analysis will be performed on biopsy samples of crown tissue of the cactus *Lophophora williamsii* (peyote) to determine if there is a correlation between the number of ribs present and the concentration of mescaline in the tissue. Peyote is a small spineless cactus that grows to approximately 10 cm in diameter with a flat to dome-shaped spineless crown with tufts of trichomes growing from the areoles. Like many rib-bearing cactus species, *L. williamsii* exhibits rib numbers that follow the Fibonacci series, specifically 5, 8, and 13, as individuals grow and age. A 5-gram biopsy sample of crown tissue will be collected from each of 30 *L. williamsii* individuals in situ: 10 with 5 ribs, 10 with 8 ribs, and 10 with 13 ribs. Alkaloids will be extracted from each sample using

methanol followed by an acid-base washing procedure. The extracted alkaloids will then be examined by reverse-phase high-pressure liquid chromatography (HPLC) to quantify the concentrations of mescaline. This information, in the context of the current scarcity of peyote in the wild, will further add to a scientific understanding of peyote which may help to generate support for delaying harvesting of small plants, thereby allowing younger crowns ample time to grow to a size that will develop a more mature subterranean stem structure that could better support axillary branching from the subterranean areoles, and thus new crown production after the original crown is harvested.

- 1:00 003.003 G **Mescaline content in over-the-counter anti-rheumatics presumed to contain *Lophophora williamsii* (peyote)**, Robert Joseph LeBlanc, Graduate Student; Martin Kilman Terry, Sul Ross State University  
This study has investigated samples of commercial over-the-counter products that were purported to contain *Lophophora williamsii*, a vulnerable overharvested species of cactus. The purpose of this investigation was to indicate the presence or absence of *Lophophora williamsii* in the products. Samples were extracted with organic solvent and acid-base washed to remove impurities. The alkaloids were separated through silica gel preparatory columns, and then analyzed with High Pressure Liquid Chromatography (HPLC) and Mass Spectrometry (MS). This has indicated the presence or absence of the stable and abundant alkaloid mescaline (3,4,5-trimethoxyphenethylamine) in samples of ostensibly *Lophophora williamsii*-infused oils, gels, and ointments that were distributed commercially as topical remedies. If detectable levels of mescaline were found in a given extract, then it was inferred that *Lophophora williamsii* was present in the corresponding topical product. Implications of the results for the conservation of peyote as a vulnerable species are presented and discussed.
- 1:15 003.004 N **Phylogenetic reconstruction of *Mentzelia* section *Bicuspidaria* (Loasaceae) based on plastid and nuclear ribosomal DNA sequences.**, Joshua M. Brokaw, Abilene Christian University; John J. Schenk, Georgia Southern University  
*Mentzelia* section *Bicuspidaria* is a group of desert annuals containing five taxa distributed in northwestern Mexico and the southwestern United States. Here we present the first fully resolved phylogenetic reconstruction of *Bicuspidaria* based on plastid and nuclear ribosomal DNA sequences. Reconstructions suggest two major clades within *Bicuspidaria*. The 'northern *Bicuspidaria* clade' composed of *M. reflexa*, *M. tricuspis*, and *M. tridentata* is endemic to the southwestern United States. The 'southern *Bicuspidaria* clade' is composed of *M. hirsutissima* and *M. involucrata*, species distributed on both sides of the

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Mexico-United States border. Furthermore, reconstructions based on both plastid and nuclear markers suggest that *M. hirsutissima* is paraphyletic with respect to *M. involucrata*. These two clades of *M. hirsutissima* populations are distinguished most reliably by geography. The 'northern *M. hirsutissima* clade' occurs in southern California and Baja California and is sister to *M. involucrata*. The 'southern *M. hirsutissima* clade' has been found only in Baja California Sur and Cedros Island at the southwestern tip of Baja California. Further work is needed to determine the taxonomic status of these previously unrecognized clades.

- 1:30 003.005 N **The angiosperm family Lauraceae in Texas**, David E. Lemke, Texas State University  
The Lauraceae are a large, mostly tropical and subtropical, flowering plant family comprising thirty-plus genera and more than 2000 species. Most members of the family are trees or shrubs with small, apetalous flowers bearing multiple series of stamens with anthers that dehisce by two or four uplifted valves. A recent floristic review of the family in Texas shows that five genera and six species are native to or naturalized in the state. One genus, *Cinnamomum*, is characterized by the presence of domatia in the axils of the major veins on the abaxial leaf surface. These small, pit-like structures may provide carnivorous or fungivorous mites with refuge from potential predators or act as protected areas in which eggs can be laid and hatch and, in return, the plant may benefit indirectly from reductions in either herbivory or attack by fungal pathogens. The peculiar parasitic genus *Cassytha*, which was not reported as occurring in Texas in the *Flora of North America* treatment of the family, has recently been documented from coastal dunes in Cameron and Willacy counties. The consequences of the recent detection in Texas of laurel wilt, a fungal disease caused by the sordariomycete *Raffaelea lauricola* and transmitted by the redbay ambrosia beetle (*Xyleborus glabratus*), will be discussed.

**004. Chemistry & Biochemistry Oral Session 1**

12:30 to 2:30 pm

Marie Hall Building, Room 101

Chemistry and Biochemistry

Chemistry & Biochemistry Oral Session 1

Participants:

- 12:30 004.007 N **Can lanthanide glutarate chlorides be converted into lanthanide glutarate terephthalates?**, Ralph Zehnder, Angelo State University  
Slow diffusion methods between lanthanide chlorides,  $\text{LnCl}_3 \cdot x\text{H}_2\text{O}$ , and glutarate at room temperature (RT) lead to the creation of four isomorphous lanthanide glutarate chlorides,  $[\text{Ln}_2(\text{Glut})_2\text{Cl}_2(\text{H}_2\text{O})_8] \cdot 2\text{H}_2\text{O} \cdot \text{THF}$ , with Ln = La - Nd. The products form 3-dimensional (3D) open frameworks with  $\text{Ln}_2\text{O}_{18}$  coordination polyhedra and a topology of a 4-coordinated sql net. The materials

slowly dissolve in water under liberation of the interstitial THF and formation of Ln-glutarate hydrates. The resulting products crystallize as  $[\text{Ln}_2(\text{Glut})_3(\text{H}_2\text{O})_3] \cdot 5\text{H}_2\text{O}$ , with Ln = La - Pr, and  $[\text{Nd}_2(\text{Glut})_3(\text{H}_2\text{O})_2] \cdot 3.5\text{H}_2\text{O}$ . Under the same experimental conditions and the addition of terephthalate derivatives the corresponding glutarate terephthalate compounds form,  $\text{Ln}_2(\text{Glut})_2(\text{TP})(\text{H}_2\text{O})_4 \cdot 17\text{H}_2\text{O}$ , with Ln = La - Nd. These also assemble as 3D-networks with identical  $\text{Ln}_2\text{O}_{18}$  coordination polyhedra. The  $[\text{Ln}_2(\text{Glut})_2\text{Cl}_2(\text{H}_2\text{O})_8] \cdot 2\text{H}_2\text{O} \cdot \text{THF}$  form SBUs composed of 2D Ln-glutarate chains along the *ici*-axis that are isorecticular to the SBUs found in the lanthanide glutarate terephthalate compounds. Thus, we believe that these materials provide preassembled SBUs that assist with the further creation of the  $\text{Ln}_2(\text{Glut})_2(\text{TP})(\text{H}_2\text{O})_4 \cdot 17\text{H}_2\text{O}$ .

- 12:45 004.008 U **Cobalt porphyrins supported by zirconium phosphate layers as OER electrocatalysts**, Isabel Barraza, Student; Dino Villagran, Professor  
Metallated Porphyrins have been widely used as homogenous electrocatalysts for the hydrogen evolution reaction (HER) and the oxygen evolution reaction (OER). Zirconium Phosphate nanolayers were used as a catalyst supports for two Cobalt based porphyrins, tetra carboxyphenyl porphyrin (CoTcPP) and tetra sulfonatophenyl porphyrin (CoTsPP). The intercalated material has shown high activities for the OER as a heterogenous electrocatalyst, higher than those previously reported by Zirconium Phosphate nanolayers intercalated by single metal cations.

- 1:00 004.009 U **Computational studies of radiofluorinated Gallium Complexes with potential use as PET imaging agents**, Aaron Torres, University of Houston-Downtown; Dr. Maria Benavides, University of Houston-Downtown: Department of Natural Sciences

Positron emission tomography (PET) is a non-invasive diagnostic imaging technique used in the detection of cancer and other medical conditions by observing metabolic processes. It requires the use of contrast agents consisting of complexes containing positron emitting isotopes. Recently, two gallium (III) azamacrocyclic complexes containing fluorine-18 were designed and synthesized as potential PET imaging agents. This study explores the chemical nature of these two complexes using a computational approach to yield valuable information that can be used to gauge potential use as imaging agents. The quantum mechanical method, density functional theory (DFT), was used in combination with various basis sets to perform geometry optimization and harmonic frequency calculations to yield equilibrium geometries, molecular energies, dipole moments, IR spectra, and molecular orbital energies. All calculations were performed using the software package, Gaussian 09.

Our results indicate that these compounds are highly polar and thus likely water-soluble, with dipole moments ranging between 15-16 Debye's. The complexes possess chemical stability, as suggested by their highest occupied molecular orbital (HOMO) - lowest unoccupied molecular orbital (LUMO) energy gap corresponding to 5.7 eV. The accuracy of our molecular models was assessed from the comparison of the computed and experimental IR spectra, and the comparison of our optimized structures to the reported crystal structures. The IR spectra were found to be in 95% agreement, while the computed geometries were found to be in excellent agreement with the crystal structures. This confirmed that the computed molecular models are good representations of the two complexes.

1:15 004.010 U **Control of metal nanoparticle parameters using polyamine capping agents**, *Michael Ray Hayes, research; Thomas Edward Ready, Midland College*

Metal nanoparticles have demonstrated varied applications such as utility as anti-bacterial/anti-cancer drugs, and as visible/fluorescent dyes with utility as chemical or biological probes. Previous studies have shown that therapeutic and optical properties vary significantly with the size of the of the nanoparticle and with the type of outer coating (capping agent) used during the nanoparticle synthesis. The type of capping agent used can also play a role in biological cell recognition/targeting. Here we describe the use of 3 different polyamines; putrescine, spermidine, and spermine as capping agents for the synthesis of silver nanoparticles. The relationship between polyamine structure /nanoparticle size as well as the relationship between polyamine - silver ion stoichiometry/nanoparticle size are discussed. Characterization via SEM and UV-Visible absorption spectrometry are presented.

1:30 004.011 G **Efficient photocatalyst for visible light water photolysis**, *Tahmina Akter, University of Texas at El Paso; Geoffrey Saupe, University of Texas at El Paso*

A visible light active porous metal oxide photocatalyst was prepared using niobium and titanium oxides. The new material exhibits high quantum efficiency in the production of hydrogen from water under visible light, using a sacrificial electron donor. The metal oxide is a wide band gap semiconductor, which becomes visible light capable when sensitized with a ruthenium based dye. The synthetic methodology introduced creates unique composite materials with outstanding dye loadings. Co-catalysts of metallic nanoparticle platinum are deposited in an unusual way. Synthesis, characterization, and kinetic data will be presented.

1:45 004.012 G **Theoretical calculations of UV-Vis spectrum and binding energies of TMPyP and TPyP porphyrins with Pb<sup>2+</sup>, Hg<sup>2+</sup>, Cu<sup>2+</sup>, Cd<sup>2+</sup>, Zn<sup>2+</sup>, and Fe<sup>2+/3+</sup>**, *Christopher Orr, Stephen F. Austin State*

*University; Brian Barngrover, Stephen F. Austin State University*

A computational study of two porphyrins binding to divalent metal ions, and the resulting spectra of these porphyrin metal complexes are being calculated. The calculations will be done using Density Functional Theory (DFT). The two porphyrins that are being studied are, meso-tetra(N-methyl-4-pyridyl) porphyrin tetrachloride (TMPyP), and meso-tetra(4-pyridyl) porphyrin (TPyP). The porphyrins are very similar in structure, varying only in the methylation of the pyridyl group on the porphyrin. The reason that these porphyrins are being studied is they have a very well-known chelating ability. It is this chelation that makes these porphyrins uniquely suited to act as a method for the detection of metal ions in aqueous solution.

Porphyrins can act as a cheaper method for detecting metal ions when compared to the more expensive instrumental methods. Metal ions prove to be a health concern across the globe. The metal ions that we are most interested in lead (Pb<sup>2+</sup>), mercury (Hg<sup>2+</sup>), iron (Fe<sup>2+</sup>, and Fe<sup>3+</sup>), Zinc (Zn<sup>2+</sup>), cadmium (Cd<sup>2+</sup>), and copper (Cu<sup>2+</sup>). By looking into how the porphyrins act, and bond with the metal ions a better understanding of how these molecules behave as chelators.

2:00 004.013 U **Theoretical stereochemistry of Co(II) IDA with histidine tags to identify binding energies utilizing DFT**, *Lindsey Ohmstede, Stephen F. Austin State University; Brian Barngrover, Stephen F. Austin State University*

To keep different things together requires energy, this is referred to as binding energy. In this instance, we are combining Cobalt IDA to Histidine Tags and analyzing the binding energy between them. Using the density functional theory (DFT) calculations for the enthalpy of reaction, which would give us the binding energy. The specific method being modeled is called immobilized metal-affinity chromatography or IMAC. "In IMAC the adsorption of proteins is based on the coordination between an immobilized metal-ion and an electron donor groups from the protein surface" (Gutiérrez, 2007). Work done with Cobalt IDA to Histidine Tags is not commonly done. Nickel (Cong Li, 2014) is also commonly used (Velkov, 2008). The drawback is that Nickel (Gutiérrez, 2007) does not yield as much pure protein (Dong, 2010). Using DFT we will calculate the binding energies for Cobalt IDA to Histidine Tags and the resulting water that is produced from the reaction. The program processing calculation is ADF (te Velde, 2001). This will provide evidence to further understand the differences in the enthalpy between Cobalt IDA and other metals used when bonding with histidine tags.

2:15 004.014 U **Fundamental growth mechanism of thiolate protected platinum nanoparticles**, *Alexandria Cook, Stephen F. Austin State University; Brian Barngrover, Stephen F. Austin State University*

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developing field. Their unique size and chemical composition allow them to be utilized in a wide range of applications. These applications include medicine, technology, and agriculture to name a few. For these specific uses unique sizes, shapes, and compositions must be controlled. In this research project, the fundamental growth mechanism of thiolate protected platinum nanoparticles is being studied with the aid of Density Functional Theory (DFT). This will allow for a better, controlled understanding of the formation of platinum thiolate nanoparticles. Using a computational approach is more cost effective than the trial and error method that is employed in traditional colloidal syntheses.

**005. Conservation Ecology Oral Session & Section Meeting**

12:30 to 2:30 pm

Marie Hall Building, 202

Conservation Ecology

Conservation Ecology Oral Session & Section Meeting

Participants:

12:30 005.015 N **Misidentification of land snails in museum collections**, Jeff Nekola, University of New Mexico; Ben Hutchins, Texas Parks and Wildlife; Briante Najev, University of Texas Rio Grande Valley; Alison Schofield, University of Texas Rio Grande Valley; Kathryn Elizabeth Perez, University of Texas Rio Grande Valley  
Organisms preserved in natural history museums are a primary source of data for many aspects of species' biology including genetics and geographical distribution and a record of how these might change over time or in the face of changing environmental conditions. These museum data can be used to prioritize funding and efforts for conservation and are increasingly accessible online, allowing for data use without physical visits to the collection. Therefore, it is important to understand the quality of this data. In this study we investigate the quality of museum record data for land snails, a group that suffers from severe taxonomic impediment and which has received minimal attention since the 1940s. We confirmed the identifications of 4023 lots from a survey of two Texas museum collections, both of which had snail taxonomists as curators. In this survey, we found that 42% of land snail lots had incorrect names with about half of these due to outdated taxonomy and half due to misidentification. Based on this finding, we suggest that analysis of unverified museum records of land snails, such as those from an online database, would likely incorporate so much error that results would be erroneous.

12:45 005.016 G **Nesting ecology of Common Black Hawk (*Buteogallus anthracites*) and Gray Hawk (*Asturina nitida*) at Big Bend National Park**, Fabiola Baeza-Tarin, Sul Ross State University  
FABIOLA BAEZA-TARIN, Department of Natural Resource Management, Sul Ross State University,

Alpine, TX 79832, USA SEAN PATRICK GRAHAM, Department of Biology, Geology, and Physical Sciences, Sul Ross State University, Alpine, Texas, 79832, USA ABSTRACT.- We assessed the diets of two Neotropical raptors at Big Bend National Park. The Common Black Hawk (*Buteogallus anthracites*) and the Gray Hawk (*Asturina nitida*) are rare southwestern U.S. raptors that have inhabited the Big Bend area every summer for the last decade. Although they have been residents of our area for the past ten years, their nesting ecology at the northern limits of their distribution is poorly explored. We observed a nesting pair of each species for 3 months to provide insight into their dietary habits and nesting phenology. Observation occurred from mid-May to mid-August accounting for 468 total hours of observation. A total of six prey returns were observed in the gray hawk's nest. Two spiny lizards (*Sceloporus* spp.), one ground squirrel (*Spermophilus* spp.), one water snake (*Nerodia erythrogaster*), and one unidentified prey were among the nest returns caught on camera. We also observed a Desert Cottontail rabbit (*Sylvilagus audubonii*) returned to the nest observed through binoculars. Six prey deliveries were observed to the black hawk's nest. Among them were three arthropods, one horned lizard (*Phrynosoma* spp.) and two frogs (*Lithobates* spp.). Novel information was also found on eggshell disposal after hatching giving a better understanding of the nesting behaviors of gray hawks.

1:00 005.017 N **New distribution records for amphibians and reptiles of East-Central Chihuahua, Mexico**, Tomas Hernandez, Midland College; Mark Herr, University of Kansas; Skylar Stevens, Sul Ross State University; Sean Graham, Sul Ross State University  
The distribution of amphibians and reptiles is less well known in Chihuahua, Mexico compared to adjacent areas of the United States. To address this gap in our knowledge, we conducted a series of expeditions to Ojinaga and Manuel Benavides municipalities in east-central Chihuahua during 2014-2017. This region contains vast areas of Chihuahuan Desert scrub, desert grasslands, cattle ranches, and a small, isolated sky island (the Sierra Rica). We documented 40 new municipal records for amphibians and reptiles with high quality digital photos. In addition, we documented two new state records for Chihuahua (*Gerrhonotus infernalis* and *Syrhophus guttilatus*) and the first country record for the snake *Tantilla cucullata*, which until now was considered endemic to the Trans-Pecos region of the United States. Most of the new records we report were associated with desert and grassland habitats because access was more limited for high elevation locations. However, most important new records were found in these habitats, suggesting that additional surveys to the Sierra Rica may reveal new state records for species such as *Pantherophis bairdii* and *Lampropeltis alterna*. We recommend similar efforts in other areas of Mexico; anyone interested in

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these animals can document new records using only a digital camera or phone.

- 1:15 005.018 N **Prey of the Loggerhead Shrike <Lanius ludovicianus> in West Texas**, Sean Graham, Sul Ross State University; Morgan Seiler, Sul Ross State University; Crystal Kelehear, Sul Ross State University  
While the ecological impacts of apex predators are well known, the trophic effect of secondary consumers (“mesopredators”) is less well known and more difficult to quantify. Loggerhead shrikes are small predatory birds that are common secondary consumers in open habitats throughout the United States. Loggerhead shrikes are generalist predators on arthropods and small vertebrates and important selective agents on these animals. We surveyed an active shrike larder (a barbed wire fence) in West Texas once per month during 2014-2017 to quantify the seasonal abundance and identity of shrike prey. We also studied prey turnover time weekly during 2017 to estimate the total number of prey impaled at this location. 1295 individual prey items were collected during 34 surveys. Shrikes preyed upon 15 orders of arthropods and 13 species of amphibians and reptiles, and several unidentified species of small mammals and birds. Incidence and diversity of impaled prey was highest during October-December. Orthopterans (mostly grasshoppers) were the most abundant impaled prey (average 18 found impaled per survey), followed by Coleopterans (average 14 found per survey) and lizards (average 6 per survey). Our estimates of predation rates suggest impaled prey turnover time at this larder is rapid, so that our monthly collections exemplify less than one week of predation on average by the local population of shrikes. In addition, shrikes often consume prey immediately and only impale a small subset of their prey. Therefore, the number of prey killed by shrikes is considerably higher than the total numbers reported here.
- 1:30 005.019 U **Survey of reptiles and amphibians of the Trans-Pecos Region, Texas**, Noah Koby Fields, Sul Ross State University; Sean Graham, Sul Ross State University  
The Trans-Pecos region of Texas is home to a diverse array of reptile and amphibian species occupying the various habitat associations found within the region. Surveys were conducted during the active season (March through November) to determine the relative abundance and habitat associations of reptile and amphibian species native to this region. Surveys were divided into two primary categories: road cruising and visual encounter surveys. Road cruising involved driving slowly on five standardized road routes repeatedly once per week at night and noting all specimens found. Visual encounter surveys involved hiking on five standardized trail routes repeatedly once per week and noting all specimens found. The most abundant reptile species found via road cruising surveys was *Crotalus atrox*, followed by *Hypsiglena jani*,

*Bogertophis subocularis*, and *Crotalus scutulatus*. The most abundant reptile species found via visual encounter surveys was *Sceloporus merriami*, followed by *Aspidoscelis scalaris*, *Sceloporus cowlesi*, and *Urosaurus ornatus*. The most abundant amphibian species found via road cruising was *Hyla arenicolor*, followed by *Scaphiopus couchii*, *Anaxyrus speciosus*, and *Anaxyrus punctatus*. The most abundant amphibian species found via visual encounter surveys was *Hyla arenicolor*, followed by *Anaxyrus punctatus*, *Lithobates berlandieri*, and *Scaphiopus couchii*. All species were georeferenced and habitat associations for all species will be determined using a GIS. Determining the relative abundance and preferred habitat association of the diverse and often secretive herpetofauna of the Trans-Pecos allows for a better understanding of the conservation needs and priorities of this region.

- 1:45 005.020 G **Terrestrial snail population assessment in the Rio Grande Valley of Texas**, Briante Najev, University of Texas Rio Grande Valley; Jeff Nekola, University of New Mexico; Ben Hutchins, Texas Parks and Wildlife; Alison Schofield, University of Texas Rio Grande Valley; Kathryn Elizabeth Perez, University of Texas Rio Grande Valley  
Land snails are easily overlooked, but immensely important, inhabiting many habitats. There has not been a comprehensive census of terrestrial snail populations in Texas. Most past collections primarily targeted single species, usually focusing on large snails (> 5 mm maximum adult size). The result is a lack of current and accurate knowledge of the status of land snail populations across Texas and, consequently, questionable conservation status rankings for several terrestrial snail species. Understanding the abundance and occurrence of snail species will help update our understanding of the status of Texas land snail populations and base conservation rankings on high-quality data. We have visited over 40 localities within the Rio Grande Valley, collecting snails by hand and in leaf litter samples to quantify macro- and microsnail relative abundance. To date, we have collected and identified 16,253 total individuals in the Rio Grande Valley. On average, sites possessed 10 species, ranging from 2 to 18. The Sabal Palms thornscrub Sanctuary in Brownsville, Cameron County possessed the highest species richness. *Guppya gundlachi* was the most common species found at the Sabal Palms site.

**006. Freshwater Science Oral Session & Section Meeting**

12:30 to 2:30 pm

Marie Hall Building, 203

Freshwater Science

Freshwater Science Oral Session & Section Meeting

Participants:

- 12:30 006.022 G **Determining the host fish of a state-listed freshwater mussel species, *Pleurobema riddellii***, Elizabeth Hinkle, University of Texas at Tyler  
Freshwater unionid mussels are one of the most



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imperiled groups of invertebrates. Primary contributors to their decline include damming, sedimentation, environmental toxins, and habitat destruction and fragmentation. There are approximately 300 unionid species in North America with 53 of them occurring in Texas. Six of the Texas unionids are state-listed and being petitioned for federal protection under the Endangered Species Act of 1973. The Louisiana Pigtoe mussel, *Pleurobema riddellii*, is one petitioned species which historically occurred as far west as the San Jacinto and Trinity rivers eastward to the Neches, Sabine and Red rivers. The abundance of *P. riddellii* has decreased in recent years, and an understanding of their life-history and reproductive characteristics is imperative to federal protection status. During the larval stage of freshwater mussels' life cycle, juveniles are obligate parasites of fish. This study sought to determine the host fish for *P. riddellii* by collecting wild infected fish from the Neches river, and observing them in the laboratory. Juveniles that naturally fell from the fish were preserved, cataloged, and analyzed genetically. This portion of the research indicated the host-fish species in addition to providing morphological characterization of the juveniles, and spawning times of adult *P. riddellii*. Additionally, this study used gonadal fluid samples of wild *P. riddellii* throughout a one-year span to provide insight into population structure, reproductive size, fecundity potential, and spawning.

12:45 006.023 U **Effects of the insecticide imidacloprid on habitat selection in the freshwater amphipod *Hyalolella azteca***, Jonatan Valentin Salinas, St. Edward's University; Raelynn Deaton Haynes, St. Edward's University

Insecticides are used to eliminate pests through direct contact or systemic methods to produce a high crop yield; however, there is a cost to the use of such substances. Previous studies have established that pesticides, when introduced into aquatic ecosystems, can alter an organism's habitat selection. We hypothesized that imidacloprid, a common neonicotinoid insecticide, will interfere with habitat selection in the freshwater crustacean, *Hyalolella azteca*, that utilizes its preferred habitat (algae) both as shelter and a food source. Our prediction was that higher concentrations of imidacloprid would disrupt habitat selection, causing amphipods to move out of their preferred habitat. Laboratory experiments were conducted using amphipods and natural vegetation collected from the San Marcos River. For 24 hours, groups of five amphipods were placed in small Tupperware containers holding stream water with different imidacloprid concentrations (0.0, 0.5, 1.0, and 1.5 µg/L) and were presented with two potential habitats: algae (preferred) and coontail (less preferred). After 24 hours, amphipods were removed from the habitat in which they were found and counted. Two statistical analyses were run: a two-way ANOVA to test the difference between the sex of the amphipod and

treatments ( $p < 0.5$ ), and a Chi-square to test the difference between the number of amphipods that decided their preferred habitat to the expected ( $p < \text{critical value}$ ). Statistical values did not support our hypothesis, which may be due to the small group of amphipods in each Tupperware or how the pesticide affected them physiologically even after they chose their preferred habitat.

1:00 006.024 U **Flood pool distribution and seasonal recruitment of zebra mussels in a subtropical reservoir along the southern invasion front**, Devin Corbitt, Temple College; Jason Locklin, Temple College

Zebra mussels are an invasive species that were first reported in temperate regions of North America in the 1980s. They have since spread towards southern latitudes and currently occur in 13 Texas lakes. Although colonization and establishment of zebra mussels in southern lakes such as Texas was predicted, the long-term stability of those populations has remained questionable. This study examined the spatial and temporal distribution of mussels in a recently-infested central Texas reservoir over one year. During the study, excessive rainfall in the watershed produced elevated lake levels over a relatively short period of time, which allowed us to assess mussel recruitment and growth rates in the littoral region during the 52-d flood period. Prior to flooding in late spring/early summer, mussels were most concentrated approximately 11-12 m below the surface with densities approaching 1,500/m<sup>2</sup>. During the flood, mussel recruitment yielded densities as high as 22,000/m<sup>2</sup> at surface elevations with growth rates exceeding 130 µm/day. Although recruitment and growth rates were high during the flood, the rapidly receding waters desiccated mussels in littoral areas, possibly reducing their recruitment potential in subsequent months and years. This decline was likely due to hypoxic conditions as dissolved oxygen levels fell following the flood. The frequent nature of spates in Texas and reservoir-management strategies may result in high seasonal mortality with highly dynamic boom and bust cycles for zebra mussels in Texas and other low latitude areas.

1:15 006.025 U **Following the curve: Environmental DNA accumulation and degradation rates utilizing apple snails**, Madison Granier, Southwestern University; Matthew A Barnes, Texas Tech University; Romi L Burks, Advisor

Environmental DNA (eDNA) represents extra-organismal DNA that individuals release into their environment. Conservation efforts have recently documented more sensitive, cost effective results from eDNA rather than traditional survey methods. Improved understanding of the origin, state, transport, and fate of eDNA provides insight into its utility and limitations, thereby improving confidence in conservation studies. We quantified eDNA production by the freshwater

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apple snail (*Pomacea maculata*) and investigated how abiotic factors influenced eDNA accumulation and degradation. We placed adult snails in a two-by-two mesocosm design (N=5) with warm and cool temperature treatments crossed with freshwater and salt treatments (6 ppt). DNA accumulated over 72 hours. After this time, we removed the snails and allowed DNA degradation to occur over the next 72 hours. We took water samples (250 mL) at 12 time points and then ran material through 1.2 µm Isopore membrane filters to retain eDNA (feces, slime, tissue, etc...), which we later extracted with chloroform to obtain total genomic DNA for use in quantitative PCR (qPCR). We detected eDNA in all treatments for at least 24 hours after snail removal. In addition, eDNA had greater accumulation and a faster degradation rate at higher temperatures. Low salt tended to increase eDNA quantity, especially at warmer temperatures, but failed to notably influence degradation. Overall, this research will continue to add valuable insight into the ecology, persistence, and the ultimate fate of eDNA. These results provide a foundation for further investigations of factors that influence eDNA accumulation and degradation.

- 1:30 006.026 U **Unraveling the mystery: Species determination and distribution patterns of two Asian mysterysnail species (*Cipangopaludina japonica* and *C. chinensis*)**, Shannon M Walsh, Southwestern University; Romi L Burks, Advisor  
Successful aquatic invasive species often have close relatives that have also established reproducing populations in non-native ranges. *Cipangopaludina chinensis* and *C. japonica*, commonly referred to as Asian mysterysnails, have spread throughout North America since their introduction in the 1890s. Their spread poses a threat to native species through competition for resources, alterations to their new ecosystems, and transmission of parasites to humans. These two Asian mysterysnails remain difficult to distinguish with only morphological characteristics due to similar life histories and occupying ecologically equivalent niches. According to the United States Geological Survey's Nonindigenous Aquatic Species Database (2017), *C. chinensis* appears more widespread than *C. japonica*, with 36 and 19 states containing established populations, respectively. However, our laboratory recently (2015) happened upon an undocumented occurrence of *C. japonica* in Texas, in a locale separated extensively from existing recordings of *C. chinensis* found in Texas. Previous introductions of mysterysnails may be misidentified using only morphological characteristics. Therefore, this research focuses on studying documented populations of *C. chinensis* to discover if any *C. japonica* individuals occur within collections. This project will use genetic analyses to amplify cytochrome *c* oxidase subunit I (COI), a common barcoding gene for genetic sequencing, for ~200 Asian mysterysnails found primarily in the Midwest USA. After confirming

identity with phylogenetics, we will create a haplotype map to identify if multiple haplotypes of *C. chinensis* and *C. japonica* occur in the collections and to indicate if the spread of these invasives happened from multiple introductions into the United States.

**007. Geosciences: Oral session 1**

12:30 to 2:30 pm

Marie Hall Building, 105

Geosciences

Geosciences: Oral session 1

Participants:

- 12:30 007.028 G **An insight into the origin of midcontinent unconventional using an integrated mineralogical and geochemical approach**, Giovanni Zaroni, Texas Tech University; Branimir Segvic, Texas Tech University

The Anadarko Basin located in the foreland of the Wichita Mountains in Oklahoma is one of the deepest and most prolific hydrocarbon basins in North America. Historically, the mudstones from this basin have been known as major hydrocarbon sources of the Midcontinent region. Yet, these mudstones remained relatively under-researched with respect to their provenance and clay diagenesis control over the reservoir rock properties. The focus of this study is set on the Pennsylvanian shale-rich intervals composed of alternating sequences of black shales, argillaceous sandstones and shaley interbedded sandstones. A 160 m long core with a maximum depth of 3000 m served as an excellent source of multiple mineralogical and chemical data on this prolific formation. The research aims to unravel the genesis and diagenetic evolution of the Anadarko Basin shales. Further on, it strives to understand the impact of paleo-environmental and diagenetic controls on the distribution of reservoir characteristics in the subsurface. To reach this objective several analytical techniques have been utilized including the X-ray diffraction to determine shale mineralogy and microbeam techniques needed to report on clay mineral morphologies and phase chemistry. Our preliminary data indicate detrital illite, quartz, and some minor feldspar as major shale minerals. Investigation of clay fraction highlighted the presence of mixed-layered illite-smectite along with ubiquitous chlorite and kaolinite. More work is however needed to elucidate on specific mineralogical variations that correspond to the changes in stratigraphy and sediment source mineralogy, and in particular how susceptible shale mineralogy is with respect to progressive diagenesis.

- 12:45 007.029 U **A study of leucobands in the Wax Factory Laccolith, Big Bend Ranch State Park, TX.**, Olivia Rose Enriquez, Sul Ross State University McNair Scholar

The Wax Factory Laccolith (WFL) is located in Big Bend Ranch State Park, TX. A laccolith is an intrusive igneous rock. The WFL is approximately 32 Ma in age, and is part of the Trans Pecos Magmatic Province

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(TPMP) which was formed between 48 and 17 Ma. The WFL is composed mostly of monzonite, but has numerous light colored bands (“leucobands”) of syenite with various shapes including irregular “blebs” up to 2 meters in size and horizontal bands approximately 10 centimeters thick. Prior studies of the laccolith lacked an adequate interpretation of the light colored bands. A previous hypothesis (Farmer, 2017) suggested that the bands were caused by alteration of the rock by local spring water. Geochemical analysis on the leucobands reveals that the syenitic leucobands have an overall similar mineralogy to the monzonite, but a distinct difference in mineral composition, contradicting the hypothesis by Farmer. The variation indicates crystal fractionation, confirmed by major and trace element models. The models use a parent monzonite composition that evolves to the syenite composition with the removal of approximately 50% by mass of the observed minerals plagioclase, pyroxene, Fe-Ti oxides and apatite. In this model, the host monzonite magma formed originally and crystallized to a partially solid crystal framework. Subsequent evolved syenite magma intruded into this framework in the form of the blebs and horizontal bands. This study contributes to our understanding of the petrogenetic history of the WFL and of our overall understanding of the TPMP.

- 1:00 007.030 U **Clay minerals as Quaternary climate change indicators in the Southern High Plains, West Texas**, *Moustapha Diaby, Texas Tech University; Giovanni Zanoni, Texas Tech University; Dustin Sweet, Texas Tech University; Branimir Segvic, Texas Tech University*

The Southern High Plains in west Texas and eastern New Mexico forms a large plateau that was shaped during the last 2 Ma as the Pecos River incised to the west. Since that incision, the region has been mantled by eolian, both suspended and as sand sheets. Eolian sedimentation was cyclic, such that intervals of aggradation as loess or sand are followed by periods of landscape stability. Loess tops preserve paleosol, thus each cycle is a loess-paleosol couplet. Clay mineral composition of soil largely depends on the climatic conditions existing on land at successive periods of the geological history. The paleosols therefore comprise reliable indicators of paleo-climate. In this work, we performed a fine-scale mineralogical investigation of a 5-m thick profile punctuated by at least three paleosols within the Pleistocene Blackwater Draw Formation exposed near Slaton, Texas. Our data indicate a subtle clay-mineral transformation indicative of changing climatic conditions. XRD mineralogy demonstrated three distinct clay-rich paragenesis. First, the bottom of the section exhibits smectite as a major clay phase with minor kaolinite and illite. Upwards, smectite loses its crystallinity, and is represented by several illite-smectite intermediates (second paragenesis) whilst the remaining clay assemblage is static. Finally, the very top of the section exhibits a complete disappearance of

smectite and prevalence of detrital illite and kaolinite. Given a maximum age (1.4 to 2.0 Ma) for the Blackwater Draw Formation, this evolutionary trend of clay minerals fits the progressive cooling in North America with a last glacial maximum set at ~20 ka.

- 1:15 007.031 U **Dendrochronology: A tool to explore past climate of San Antonio**, *Janice Davila, University of the Incarnate Word; Jillian Guse, Univer of the Incarnate Word; Darcy McCutchen, Univer of the Incarnate Word; Mireles Brittany, Univer of the Incarnate Word; Kyle Sanchez, Univer of the Incarnate Word; Gerald Mulvey, University of the Incarnate Word*

The climatic records during the instrumentation period of data collection date back to 1946 at the San Antonio International Airport and farther back to 1846 from other sites in San Antonio (Grice, 2007). Specific area climates have been estimated through the use of data proxies and data interpolation. There are at least 18 different data proxy types that are generally used to study paleoclimatology. Dendrochronology, study of tree rings, is one method that has been used to extract climatological proxy data since the early 18th century. An unusually old specimen of an Arizona Ash became available at the University of the Incarnate Word in the Fall of 2017, from Terrill Hills, Texas. The specimen measured between 69 and 75 centimeters in diameter. The ring count tree age estimate was between 85 and 89 years. A meteorology student team under took a climatological analysis using the tree ring numbers and widths. A digital microscope, calibration rulers, calipers, and stage micrometers were used to extract the tree ring data. The historical meteorological records were used to develop a response function. This airport site is approximately eight kilometers away from the tree location. The response function was developed by a regression of the ring width against the annual growing season temperature and rainfall amounts using the statistical package “R”. This correlation will then be used to estimate the climate during the period before the airport records. The results will be compared against the San Antonio climate records from other locations within the city.

- 1:30 007.032 N **Development of rill marks on the beach face at Galveston Island State Park, Texas**, *Russell LaRell Nielson, Stephen F. Austin State University*  
Well developed rill marks are present on the beach face at Galveston Island State Park, Texas. These rill marks are produced as the tide goes out by water draining from the berm and bars that are found on the beach face. They develop in zones where there is a higher permeability in the berm and bars that run parallel to the beach face. These zones contain coarse clasts and fossil fragments and a small amount of clay. Below and above each permeable zone, the sand contains fewer large clasts and shell fragments and larger amounts of clay resulting in the zone being less

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permeable. Rill marks are produced by a thin film of water that flows out of the sand and down the beach face following the breaking of each wave as the tide goes out. Rill marks are divided into five different types: fringing, conical, branching, meandering, and bifurcating. All five types of rill marks are found on the beach face at Galveston Island State Park. The type of rill mark present is determined by: the angle of the slope on the berm and bar face, the amount of porosity and permeability of the sand, and wave impact direction and intensity. They are best developed on stormy days with high tides. Rill marks are rarely preserved in the rock record because the next high tide destroys the rill marks that developed during the last low tide.

**008. Neuroscience Oral Session & Section Meeting**

12:30 to 2:30 pm

Marie Hall Building, 209

Neuroscience

Neuroscience Oral Session & Section Meeting

Participants:

12:30 008.033 U **A molecular study of the effects of BPA on hippocampal neurons.**, *Hannah Reiley, Texas Lutheran University; Danielle D. Grove, Texas Lutheran University*

These studies are aimed at understanding how environmental estrogens affect neurons at the molecular level. Environmental estrogens are estrogens that are not produced by our bodies, but they can bind to estrogen receptors throughout our bodies. We are exposed daily to environmental estrogens through many manufactured products. Environmental estrogens include bisphenol A (BPA) which has been shown to affect the brain when it comes to behavioral studies. However, less is known about the effects BPA has at the cellular or molecular level. This work attempts to bridge that gap by growing neurons in culture and exposing them to BPA to see if a transcription factor, phosphorylated CREB, is activated. The amount of phosphorylated CREB that is activated is a reflection of the effect that BPA has on the neurons. This is measured in an immunoassay, also known as an indirect ELISA. Currently, results with hippocampal neurons have been promising. Cells were treated with varying dosages of BPA, ranging from  $10^{-16}$  M to  $10^{-7}$  M, then analyzed with an indirect ELISA. Consistently, BPA produced statistically significant ( $p < 0.05$ ) biphasic effects on these hippocampal neurons. Future directions include investigating hippocampal neurons more thoroughly to determine the effects of BPA and other environmental estrogens on these cells. In addition, future research should investigate the effects of BPA on neurons from other brain regions, such as striatal neurons.

12:45 008.034 G **Positive cognitive and affective effects of transcranial infrared laser stimulation of the human prefrontal cortex**, *Courtney Alexander, University of Texas at Austin; Celeste L. Saucedo, University of*

*Texas at Austin; Douglas W. Barrett, The University of Texas at Austin; F. Gonzalez-Lima, The University of Texas at Austin*

Transcranial infrared laser stimulation (TILS) of the prefrontal cortex is a novel intervention that can potentially enhance human brain functions and protect against cognitive and affective deficits. The primary mechanism of action of TILS is the delivery of photons to brain cells, upregulating the enzymatic activity of cytochrome oxidase in vivo, enhancing the brain's ability to utilize oxygen and increasing its metabolic energy capacity. In this ongoing study, cognitive and affective impairment was assessed using: Positive and Negative Affect Schedule (PANAS-X), Montreal Cognitive Assessment (MoCA) and the Frontal Assessment Battery (FAB). Test batteries were administered before TILS (baseline) and one week after four weekly sessions of TILS (post-treatment) to the right prefrontal cortex. Participants were separated into three groups based on MoCA scores or presence of neurological condition: healthy controls ( $n=6$ , MoCA score  $\geq 26$ ), cognitive impairment symptoms ( $n=5$ , MoCA  $< 26$ ), and other neurological condition ( $n=5$ , TBI, stroke, Parkinson's). Preliminary data reported here are changes over 5% in participants given active TILS. Healthy controls showed an 8% increase in FAB scores, but no further increase in MoCA scores that were close to ceiling. However, the cognitive impairment group showed +7% improvements in both MoCA and FAB cognitive measures across the five-week period. Patients with neurological conditions showed small changes in cognitive scores; however, they had a 10% increase in positive affect. It appears subjects with cognitive impairment benefited the most from prefrontal TILS in both MoCA and FAB cognitive measures, while those with neurological conditions benefited primarily in affect.

**009. Systematics and Evolutionary Biology Oral Session & Section Meeting**

12:30 to 2:30 pm

Marie Hall Building, 107

Systematics and Evolutionary Biology

Systematics and Evolutionary Biology Oral Session & Section Meeting

Participants:

12:30 009.036 U **A new assemblage of mosasaurs from the Upper Cretaceous Savoy Pit, Austin Chalk, North Texas**, *Blake Russell Chapman, The University of Texas at Austin; Joshua Ryan Lively, The University of Texas at Austin*

We describe an assemblage of mosasaurs from the Savoy Pit of Fannin County, in northeastern Texas. The site was excavated in 1940 by the Works Progress Administration (WPA) in collaboration with The University of Texas Bureau of Economic Geology. Based on field notes from the WPA, specimens were recovered from the Upper Cretaceous (Coniacian)

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Austin Chalk, approximately 7 m above the contact with the Eagle Ford Shale. We scored material from the Savoy Pit using a combination of published and novel morphological characters and compared our results to over 200 other mosasaur specimens. We then ran a phylogenetic analysis to hypothesize the taxonomic composition of the assemblage. We identified at least three mosasaur taxa from the Savoy Pit assemblage, including *Tylosaurus nepaeolicus*, a rüsselosaurian identified from a frontal similar to that of *Russellosaurus coheni*, and a new basal mosasaurine. The latter specimen exhibits a unique combination of characters that include synapomorphies of Mosasaurinae and those observed in rüsselosaurians. Phylogenetic analyses place the specimen as an early-diverging member of Mosasaurinae and the characters of Russellosaurina could represent plesiomorphic conditions. The presence of *Tylosaurus nepaeolicus* and the rüsselosaurian represent potential range extensions of those lineages into the Coniacian. The basal mosasaurine fills a stratigraphic gap in the record of that clade between early members. Our study not only presents new data that are critical to understanding the distribution and evolution of mosasaurs, but also highlights the continued importance of specimens collected by the WPA to our understanding of the fossil record.

- 12:45 009.037 G **A new Miocene gerrhonotine from the Caliente Formation, California**, *Simon Scarpetta, University of Texas at Austin*  
Gerrhonotinae (i.e., alligator lizards) is an extant lizard clade with a rich Cenozoic fossil record in the Americas and a diverse assemblage of species still inhabiting regions of North and Central America. There are 55 extant species in six genera, but because many extant species are rare in museum collections there is currently a lack of published skeletal data, hindering accurate identification of fossils. Here, I describe a new gerrhonotine lizard known from a partial skull from the University of California Museum of Paleontology (UCMP). The UCMP specimen is from the Caliente formation in southern California and is 11.5-12.5 Ma old (Miocene, Clarendonian North American land mammal age). I used x-ray computed tomography (CT) scans to visualize the specimen and elucidate cranial anatomy that is inaccessible from the physical specimen alone. The new taxon is unique among gerrhonotines in that it possesses cephalic osteoderms with tall, sail-like keels, which is a trait previously unobserved in gerrhonotines. To place the fossil phylogenetically and taxonomically, I conducted phylogenetic analyses of Gerrhonotinae using both molecular and morphological data. These analyses incorporate morphological characters that are new to the literature as well as novel osteological CT data for many species. Preliminary analysis indicates that the specimen represents a new taxon. Additionally, I describe two other lizard fossils found in the same assemblage to help provide a

paleoecological interpretation of the habitat of the fossil gerrhonotine.

- 1:00 009.038 G **A preliminary molecular phylogeny of the Eastern US *Oxyloma* (Gastropoda: Succineidae)**, *Marco Arturo Martinez Cruz, University of Texas Rio Grande Valley; Kathryn Elizabeth Perez, University of Texas Rio Grande Valley*  
Invertebrates comprise 99% of all animal diversity but are often overlooked. Gaps in the literature demonstrate Succineidae, a family of terrestrial gastropods known as "amber snails," has been infrequently investigated in North America. The succineid genus *Oxyloma* found throughout Canada and the United States contains approximately 16 described species, whose sole criterion, shell morphology, for differentiation has proven unreliable. As a first step towards understanding the evolutionary history and revising the taxonomy of North American *Oxyloma*, we have sampled the four eastern species (*O. salleana*, *O. subeffusa*, *O. effusa*, and *O. retusa*) from their respective type localities and compared their mitochondrial COI sequences with samples found across their range. A preliminary molecular phylogeny based on mitochondrial data does not find the four nominal *Oxyloma* species examined forming monophyletic units, confirming doubts concerning the validity of these species. Our next steps include gathering nuclear data and assessing anatomical characters to revise the taxonomy of Succineidae to better understand their evolutionary history.
- 1:15 009.039 U **Does the Dear Enemy Hypothesis hold true in a sex role reversed system**, *Syngnathus scovelli?*, *Sarah Joanne Morton, St. Edward's University; Briana Martinez, St. Edward's University; Claire Adams, St. Edward's University; Ciara Crochet, St. Edward's University; Pam Cisneros, St. Edward's University; Raelynn Deaton Haynes, St. Edward's University; Sunny Scobell, St. Edward's University*  
One mechanism organisms have evolved to reduce the costs of prolonged aggression is the Dear Enemy Hypothesis, stating that aggressive behaviors will decrease over time between neighboring individuals of a given species and increase when a novel individual is introduced. Most studies to date on the Dear Enemy Hypothesis focus on territorial males. Here, we tested its applicability in a sex role reversed female, the gulf pipefish *Syngnathus scovelli*. We predicted these territorial females would display fewer aggressive behaviors to neighbors over time, and more aggressive behaviors toward novel females. We also predicted that aggressive behaviors of dominant females would decrease toward subordinate females after a dominance hierarchy had been established. To test this, we collected mature female *S. scovelli* from Port Aransas, TX. We used repeated measures ANOVA to observe behaviors across 3 days, measuring aggression and activity of females on both days, allowing time to establish dominance. On day 3, either a novel or

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familiar female was introduced to the dominant female. To date, data show that dominance is not clearly established across two days. However, for some behaviors, dominant females performed more aggression toward the novel female as predicted. This study sheds light on the general applicability of an established ecological theory in a novel system (sex role reversal) whereby females are territorial and aggressive, rather than males.

- 1:30 009.040 U **Impact of social context on mating behavior and sperm competition in the western mosquitofish**, Amber Raven, St. Edward's University; Raelynn Deaton Haynes, St. Edward's University  
The western mosquitofish (*Gambusia affinis*) is a live bearing species of fish with males that employ a coercive mating system and force copulation with females. In this study we sought to determine whether the social environment of males affects sperm expenditure and mating behaviors. We placed focal males into various social settings, including a control with no stimulus, female stimulus only, and two competition treatments containing a female and either one or two males. Males remained in the treatments for seven days, and sperm samples were collected on days four and seven with behaviors observed on day four prior to sperm collections. We hypothesized that social environment would affect mating behaviors and sperm expenditure in this species. Our initial prediction was that males exposed to competitors would display fewer mating behaviors, but more gonopodial displays and higher sperm expenditure. Conversely, males that had been isolated or exposed only to females would mate more frequently but would have lower sperm expenditure and fewer gonopodial displays. To date, data indicates that the social environment of male *G. affinis* does not influence mating attempts or frequency of gonopodial displays. Analysis of sperm data revealed that there was a significant impact of social environment on the sperm count collected from males on day seven ( $p = .003$ ). However, this difference was not significant on day four or for the change between days. More detailed analysis is in progress and full findings of both behavioral and sperm data will be presented at the meeting.

- 1:45 009.041 U **Testing the Novelty Hypothesis as an explanation of heterospecific mating in livebearing fishes**, Dylan J Wichman, St. Edward's University; Raelynn Deaton Haynes, St. Edward's University  
In nature, males should prefer to mate with females of the same species to avoid hybridization. However, recent studies have shown levels of male permissiveness being higher than expected. The Novelty Hypothesis is a possible explanation for such increases. This hypothesis states that males are more likely to notice, and subsequently mate with, a female they perceive as different, resulting in "mating mistakes." We tested this hypothesis in two species of

mosquitofish from Central Texas: Western mosquitofish (*Gambusia affinis*) and Largespring gambusia (*Gambusia geiseri*). In order to examine whether the novelty of a female can provide a mechanism for permissiveness, males of both species were acclimated for approximately three to six weeks within three groups: (1) conspecific, (2) heterospecific or (3) both conspecific and heterospecific females. Males were placed in a 10-gallon tank to examine both association time and copulation attempts towards conspecific and heterospecific stimulus females. Based on mean association time differences between the six treatments, males acclimated with conspecific females desired heterospecific females more frequently at similar rates across species. After measuring mean differences in gonopodial displays towards females, males displayed significantly more towards heterospecific females after being acclimated with their own species, rather than both or the novel species. These factors indicate that mating permissiveness was evident across both species, however, they also show that mating permissiveness was significantly higher in males not exposed to the other species.

**010. Poster Presentation and Judging for: Anthropology; Botany; Conservation Ecology; Environmental Science; Freshwater Science; Geosciences; Mathematics & Computer Science; Neuroscience; Physics & Eng; Science Education; Terrestrial Ecology & Management.**

2:30 to 4:00 pm

Marie Hall Building, Corridor A

Anthropology

Anthropology Poster Session

Participants:

010.043 G **Human skeletal evidence: Perspectives for narcotrafficking group identifications through modus operandi from the medico-legal department in Heredia, Costa Rica**, Kashmiere Nicole McGee, Texas Tech University; Paola Prada, TTU Research professor PhD.

After attending this poster, attendees will obtain a better understanding of the effects of the growth of narcotrafficking in Costa Rica and its influence on Forensic Anthropology and human skeletal analysis. In recent years global homicide rates have increased in startling proportions, globally, due to a variety of factors. On such factor, the influence of narcotrafficking has impacted Latin American homicide rates causing them to rise to epidemic levels. In particular, Costa Rica represents prime example of where a distinguishable and direct correlation between the presence of narcotrafficking and an increase in homicides can be demonstrated. Costa Rica has become an epicenter for violent crimes due to the influence of illicit drugs traveling through their country's permeable borders. With these growing rates of homicide, this study addresses a significant foundational research gap in understanding the modus operandi of

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narcotrafficking groups. The purpose of the study is to evaluate evidence of violence inflicted by narcotraffickers. Specifically, sharp force and ballistic trauma, such as dismemberment and gunshot trauma, found on skeletal remains were analyzed using an osteological sample of 6 individuals from the Medico-Legal Department in San Joaquín de Flores, Heredia, Costa Rica. Geographical location and narcotrafficking group association were assessed from the context of the reports. Using JMP Pro 12, multi-factor ANOVA models were performed correlating studied variables to the particular narcotrafficking group association and corresponding geographical location. To date, no other investigation of this nature has been performed in Costa Rica sampling the population used in this study.

**010.044 G Perception and nocturnal primate face masks**, *Cody J Moser, Department of Anthropology, Texas A&M University; Gül A. Russell, Department of Humanities in Medicine, Health Science Center, Texas A&M University College of Medicine*

Nocturnal primates exhibit an evolutionary convergence with several other nocturnal mammals in the overall patterning of their facial pelage. This pattern often takes the form of a “mask” marked with black convergent markings on a starkly contrasting monochromatic background. Studies in carnivores suggest that these masks function as anti-predator warning signals. Owl monkeys of the genus *Aotus*, however, exhibit a “reverse mask” marked by convergent white-on-black patterns. Phylogenetic analyses have shown that adaptation to a nocturnal niche in this genus, separate from the other nocturnal primates, represents a reversal from the diurnal niche occupied by its sister taxa and their most recent common ancestor. The significance of their facial markings, and why these are different from their nocturnal prosimian counterparts, have not been adequately explained. This project applies findings from the extensive neuroscience research in face perception (human and animal) to explore the hypothesis that owl monkeys’ masks have evolved to enhance individual recognition in low-light environments. This is most likely due to the loss of olfaction as a primary source for recognition, more complex cerebral development, and lack of a light-reflecting *tapetum lucidum*.

**010.045 U Precision in 3D Prints: The case of MH1 (*Australopithecus sediba*)**, *Lauren J. Hammond, Texas A&M University; Kersten Bergstrom, Texas A&M University; Robert Zac Selden, Stephen F. Austin State University; Darryl J. de Ruiter, Department of Anthropology, Texas A&M University*

The use of three-dimensional (3D) printed models of hominin fossils is becoming more common in biological anthropology, due in part to their low production cost. Digital meshes are also more accessible than casts, further increasing the reach and

impact of specific specimens. An inherent trust in scanning protocols and 3D printers underlies the utilization of prints, though scanner type, processing techniques, environmental variables, and proprietary algorithms used by 3D printers can, and do, influence the way that 3D prints convey the topology of the original scan. The type specimen of *Australopithecus sediba* (MH 1), downloaded from MorphoSource, is used to highlight these issues. In this study we assess the precision of five different brands of 3D printers, and subsequently the repeatability and reliability of a single printer. The original scan data are compared to the printed/scanned (measured) data in Geomagic Control X using a 3D comparison to identify global deviations, a 2D comparison to identify deviations for specific curves used in geometric morphometric (GM) analyses, and a suite of comparison points to compare deviations of specific locations on the mesh surface. This project quantitatively demonstrates which 3D printer produces models that most closely resemble the original specimen—based upon currently-deployed settings and environmental configurations—and repeatable replication of models generated on a single printer. Through a critical assessment, this project makes clear the implications and risks associated with the reuse of archived 3D meshes in research, teaching, and museum-based endeavors.

**010.046 G Taphonomic and fossil reconstructive analyses of the Ngaloba (LH 18) skull**, *Kersten Bergstrom, Texas A&M University; Lauren Butaric, Des Moines University; Agness Gidna, National Museum of Tanzania; Charles Musiba, University of Colorado Denver; Robert Zac Selden, Stephen F. Austin State University; Cassian Magori, St. Francis University College of Health and Allied Sciences*

The Ngaloba specimen (LH 18) from Lateoli, Tanzania, includes a partial maxilla and largely intact cranial vault. LH18 represents an important stage in the mid-Pleistocene *Homo* fossil record ( $205 \pm 17$  ka or  $290 \pm 25$  ka) and expresses several primitive and derived craniofacial features. Although the cranium was found in several pieces and underwent post-mortem deformation, reconstructions have allowed for morphological comparisons. Some researchers argue that Ngaloba’s general maxillary shape, reduced prognathism, and reduced robusticity align the specimen with modern humans, while others argue that intermediate alveolar prognathism and short maxilla place it in the archaic grade. Taxonomic placement of LH 18 is further complicated by the ever-changing shape of the specimen. Here, we demonstrate four events in which a portion of the right zygomaticoalveolar crest is originally attached, then re-attached incorrectly, is absent, and then is re-attached and further rotated incorrectly. The left portion of the maxilla also demonstrates post recovery wear and breakage, with palate expansion. Through analyses of 3D surface and CT scans in Geomagic Design X, we

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qualitatively and quantitatively assess the various shapes the maxilla has taken. Implications for comparative studies utilizing this specimen are also discussed. While this research highlights recent changes in LH 18, it also demonstrates the importance of scanning original specimens, and the need for supporting proper curation techniques at museums. Accordingly, this research also demonstrates the particular needs of the National Museum of Tanzania to safeguard fossil specimens for future research.

Botany

Botany Poster Session

Participants:

**010.047 U Effects of increased UV light on monoterpenes in *Mentha peperita* L., Joshua Rios, St. Edward's University**

Essential oils from plants have been used medicinally since antiquity, including their use as treatments of many infectious diseases. Studies of activity against different strains of bacteria show that peppermint (*Mentha peperita* L.) extract can act as an antibacterial agent. Peppermint extracts are also used to treat digestive problems and as tonics. Increasing the concentration of monoterpenes in peppermint plants could increase their effectiveness. Prior work suggests that increasing exposure to UV-B light increases the density and productivity of glandular trichomes on the leaves of *M. peperita* and we specifically examined the effects of UV-B radiation on the yield of monoterpenoid compounds in these glands. We cultured clones of peppermint under two light regimes, one including UV-B light, for several weeks under otherwise controlled conditions in a growth chamber. Analysis of the concentrations of monoterpenes in the two treatments will determine the effect of UV-B light on their production and potentially yield information about enhanced use of peppermint extracts in a variety of settings. Future research will be directed toward determining specific steps in monoterpene regulation, so that monoterpene expression can be amplified.

**010.048 U Molecular Identification of the 18S rDNA for *Chlorococcum* Microalgae *C. lacustre* and *C. macrostigmatum*, Joanne Elise Thomson, University of Mary Hardin-Baylor; Kathleen Wood, University of Mary Hardin-Baylor**

In the past, species of algae have been classified based on morphological characteristics. Due to the progression of scientific technology and methods, an extensive knowledge of molecular components is necessary to reveal true variation among species. In this study, the 18S rDNA was examined for microalgae *C. lacustre* and *C. macrostigmatum*. The 18S rDNA gene provides a reliable biomarker for species identification because ribosomal DNA genes are slow evolving and cannot undergo huge amounts of diversity. Genomic DNA was extracted from strains of axenic samples of *C. lacustre* and *C. macrostigmatum*

algae using the DNeasy® Plant Mini Kit. The level of purity was ascertained using NanoDrop™. A standard PCR was performed using *Lymnaea sp.* 18S rDNA sequencing primers and a primer pair based on the 5'-conserved domain region of 18S rDNA. Gel electrophoresis of PCR products produced DNA bands and were purified with the QIAquick™ Gel Extraction Kit and sequenced. Contigs were generated using CAP 3. The generated contigs and initial sequences were aligned with BLAST®. A multiple alignment of our contig sequences for the 18S rDNA gene of *C. citriforme* and *C. microstigmatum* were compared with recently published sequences of the complete 18S rDNA gene of similar organisms. This method successfully generated complete sequences for the 18S rDNA for both algae under investigation. The processes demonstrated in this study can be utilized to complete the 18S rDNA sequences of other species of *Chlorococcum* algae.

**010.049 U Progress on the vascular flora of the Runningwater Conservancy, Hale County, TX, Krista Shay 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 will continue during the growing seasons at least through the fall of 2019. Voucher specimens for all identified taxa will be deposited in a publically accessible herbarium. To date, we have identified 14 plant species in 14 genera in 6 families. This study will improve our floristic knowledge in an understudied region.

**010.050 U The effects of norflurazon treatment on photosynthesis rate and  $\beta$ -carotene concentration in wheat and corn, Mary Margaret Hillery, St. Edward's University; Jeremiah Grider, St. Edward's University**

Norflurazon is a persistent water soluble pre-emergent herbicide commonly applied to vegetable and cotton crops in the United States. It is not only mobile in the soil, but it also has a long half-life: 130 days in aerobic soils and 240 days in anaerobic soils. Norflurazon reduces biodiversity and the EPA has found that it can be toxic to aquatic animals and is very toxic to aquatic plants. This research project focused on efficacy of reduced rates of application of norflurazon for the purpose of mitigating these adverse outcomes. Corn (*Zea mays* L.) and wheat (*Triticum aestivum* L.) were grown under controlled conditions for approximately



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fifty days, with three treatments. Seeds of each species were soaked for 24 hours in solutions that contained the following concentrations of norflurazon:  $1.0 \times 10^{-8}$  M,  $0.5 \times 10^{-8}$  M, and 0 M. Because norflurazon's mode of action is to cause the degradation of the accessory pigment  $\beta$ -carotene, the photosynthetic rate of individuals exposed to each concentration was measured at week #4. In addition, plant tissue from specific leaves were collected from each individual and stored at  $-80^{\circ}\text{C}$  for analysis of  $\beta$ -carotene content. Preliminary results indicate no impact of low-level exposure to norflurazon on photosynthetic efficiency.

Conservation Ecology

Conservation Ecology Poster Session

Participants:

**010.051 N American Eel: Utilizing modern techniques to assess conservation status in Texas**, *Melissa Casarez, University of Texas at Austin; Stephen Curtis, TPWD; Dean A. Hendrickson, University of Texas at Austin; Adam E. Cohen, University of Texas at Austin; Kevin Mayes, Texas Parks and Wildlife; Gary Garrett, University of Texas at Austin; F. Douglas Martin, University of Texas at Austin*

The American Eel, *Anguilla rostrata*, is a remarkable fish that makes epic migrations throughout its complex life history, which begins in the Sargasso Sea, goes far inland in rivers of North and Central America and the Caribbean, then back to the Sargasso. Populations in U.S. and Canadian drainages have been well-studied for years, with events such as the arrival of early life stage "glass" and "elver" eels coming into coastal basins well known and predictable. However, relatively little is known about those that make their way into Gulf of Mexico and Caribbean drainages. Additionally, there is debate as to the species' conservation status, with listings among agencies ranging from 'Threatened' or 'Endangered' to no listing at all. Especially in Texas, there is a critical need for data to many unanswered questions about the species' historical and current distribution, genetics, parasites, age structure, habitat utilization, etc. to help guide establishment of effective management and conservation strategies. To help answer some of these questions, we are conducting basic sampling and genetic and life history studies, organizing a state-wide citizen-science effort to help collect specimens of all ages and sizes, and reaching out to fish enthusiasts (fisherman and scientists alike) to help better understand these astounding fishes.

**010.052 U Chemosensory signaling: behavioral interactions on interspecific competition between Gray Fox (*Urocyon cinereoargenteus*) and Red Fox (*Vulpes vulpes*)**, *Michaela Elizabeth Gephart, Hardin Simmons; Dejah Braxton, Hardin Simmons; Rachel Dugan, Hardin Simmons; Jesyka Lee, Hardin Simmons; Wendi K Wolfram, Hardin-Simmons University*  
Gray Fox (*Urocyon cinereoargenteus*) populations range throughout the United States and are a native

species to Texas. They inhabit densely wooded areas and open grasslands. Similarly, the Red Fox (*Vulpes vulpes*), a non-native species distributed throughout Texas, also uses these same habitats resulting 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. Fox species 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. The study taking place in both Taylor and Runnels County, Texas will provide information to help wildlife managers support native species populations.

**010.053 G Chemosensory signaling: Deterrent for livestock predation and support for grassland conservation**, *Hannah Stouffer, Hardin-Simmons University; Wendi K Wolfram, Hardin-Simmons University*

For many years, coyote (*Canis latrans*) populations have spread across the continental United States. An increase of shared human-coyote territory has allowed for more interaction, and a higher potential for coyote predation on livestock. Ranchers lose time and money protecting their livestock from these adaptive predators. To avoid loss, ranchers develop and employ a variety of anti-predation methods. One venue for development explores the utilization of predator communication to manipulate canid behavior. Coyotes use chemosensory signaling to alert other predators of their presence and to establish territory boundaries. Introducing the presence of predator urine samples can allow humans to reproduce scent-marking behavior to signify occupied territory. Presenting predator urine samples allows ranchers to convey control of territory, deter predation on livestock and preserve ecosystem biodiversity. Our study identified coyote behavioral responses in the presence of varying large predator urine samples and determined that wolf and mountain lion samples exhibit higher efficacy in coyote deterrence.

**010.054 G Effects of Red Imported Fire Ants on arthropod community associated with Green-flowered Milkweed plants occupied by Monarch Butterfly eggs and larvae**, *Kalynn Hudman, Texas A&M University - Commerce; Howard Crenshaw, Texas Parks and Wildlife Department; Jeremy Mayhew, Texas Parks and Wildlife Department; Jeff Kopachena, Texas A&M University- Commerce*  
Declines in Monarch Butterfly (*Danaus plexippus*) populations have resulted in an interest in the potential effects of Red Imported Fire Ants (RIFA) (*Solenopsis invicta*) on the survival of monarch larvae in Texas. A pilot study conducted in 2016 suggested that RIFA may facilitate monarch survival through indirect effects.

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Such indirect effects would depend strongly on the inter- and intra-guild interactions among arthropods on and surrounding the host plants. This study addresses the hypothesis that RIFA might cause a density-dependent trophic cascade in the milkweed arthropod community that effects monarch survival. The study will identify major components in the system and look at the relationship between RIFA and these components. These relationships will assist in making management decisions regarding the ecological communities that host monarch larvae in Texas.

**010.055 G Fall survival of monarch butterfly (*Danaus plexippus*) eggs and larvae in northeast Texas**, Alyx Rebecca Scott, Texas A&M University - Commerce; Jeff Kopachena, Texas A&M University-Commerce

The monarch butterfly (*Danaus plexippus*) has experienced population declines over the last 20 years that have caused concern for the preservation of the species. In 2014 a petition was submitted to protect the monarch under the Endangered Species Act. Eastern monarchs reproduce through a series of four or five successive generations across most of the U.S. east of the Rocky Mountains. Many fourth-generation monarchs fail to enter diapause during fall migration and lay eggs in the southern states thereby forming a fifth generation. The fifth generation of monarchs is of particular interest because of its potential contribution to the first generation the following spring. However, there is no existing data on monarch fifth generation survival for any part of the monarch butterfly's distribution. This study will be the first to document the survivorship of fifth generation monarch eggs and larvae in Northeast Texas, an area where this generation is believed to be most important. The data collected from this study will be compared to studies of other generations using similar methodology to assess the relative success of fifth generation monarchs.

**010.056 N Gauging trends in public interest in conservation issues in Texas and adjacent states: An exploratory analysis using Google Trends data**, Rick L Hammer, Hardin-Simmons University

An understanding of historic and current levels of interest by the public related to conservation issues is informative and relevant to a number of stakeholders, including governmental policy planners, scientists, and non-profit NGOs. Google Trends, with its global database of Internet search string history, represents a vast and potentially minable source of data to characterize relative levels of interest in conservation topics through time, and is increasingly being employed for such research. This study analyzes regional Google search string data from Texas, New Mexico, and Oklahoma to characterize public levels of interest and trends in conservation topics based on a number of specific conservation-related words or phrases. Preliminary results for Texas indicate a declining level

of interest in topics such as *endangered species* and *Texas Horned Lizard*, with an upward trend in the level of public interest over the last decade regarding the topic of *biodiversity*. Limitations and future prospects of this new methodology—sometimes called *conservation culturomics*—will also be considered in terms of how it may help in understanding human-nature relationships and in advancing conservation science.

**010.057 G Influence of arthropod community structure on the survival of Monarch Butterfly (*Danaus plexippus*) eggs and larvae in northeast Texas**, Misty Nixon, Texas A&M University-Commerce; Howard Crenshaw, Texas Parks and Wildlife Department; Jeremy Mayhew, Texas Texas Parks and Wildlife Department; Jeff Kopachena, Texas A&M University- Commerce

Monarch butterfly populations have exhibited significant declines over the past decade, leading to a petition for listing under the Endangered Species Act (ESA) in 2014. Understanding spring generation survivorship in Texas is important to the overall study of monarch population dynamics. Data collected on monarch survivorship during a pilot study conducted in spring of 2016 on a wildlife management area in northeast Texas indicated that there is not a simple relationship between predators and prey within the arthropod community, suggesting that community dynamics on and around plants may be an important aspect affecting monarch survivorship rates. Data from the spring 2017 season has been collected and analyzed to document the arthropod community and look for intra- and inter-trophic interactions that might be important for monarch survival. Arthropod community structure was measured along with the influence of particular species or functional groups on the survivorship of monarch eggs and larvae using *Asclepias viridis* as a host plant.

**010.058 G Influence of the green-flowered milkweed (*Asclepias viridis*) health and quality on monarch butterfly (*Danaus plexippus*) larval survivorship**, Kelsey Helgerson, Texas A&M University- Commerce; Howard Crenshaw, Texas Parks and Wildlife Department; Jeremy Mayhew, Texas Texas Parks and Wildlife Department; Jeff Kopachena, Texas A&M University- Commerce

Monarch butterflies (*Danaus plexippus*) have experienced population declines of up to 90% in the past few decades. Each spring, overwintering monarchs make their journey north from montane forest refuges in Mexico to stop in Texas and Oklahoma to breed. Many of these spring generation monarchs are reared on green flowered milkweed (*Asclepias viridis*). While there have been numerous studies on the arthropod predators present on monarch host plants and on host plant defense mechanisms, there is no information about how the health and quality of *A. viridis* affects

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monarch larval survivorship. The purpose of this study is to describe host plant characteristics of *A. viridis* and to determine what affects these traits have on monarch larval survivorship. This information may prove to be important for making informed decisions on best management practices for successful monarch reproduction in spring.

**010.059 U Predicting the distribution of seagrass habitat along the Texas Gulf Coast using Maxent**, Rachel Bittner, Texas Tech University; Elizabeth L Roesler, Texas Tech University; Matthew A Barnes, Texas Tech University

Seagrasses provide numerous essential ecosystem services to coastal ecosystems around the world, including stabilization of benthic habitats, provision of food and habitat for other benthic species, and maintenance of water quality. Five seagrass species occur along the Texas portion of the Gulf of Mexico, including shoal grass (*Halodule wrightii*), turtle grass (*Thalassia testudinum*), manatee grass (*Syringodium filiforme*), star grass (*Halophila engelmannii*), and widgeon grass (*Ruppia maritima*). However, due to disturbances caused by development and the effect of natural disasters to the wetlands where these seagrasses are found, seagrass habitats are in decline. Based on a literature search, we identified a suite of variables we considered most useful for predicting seagrass locations: bathymetry, salinity, nitrogen, and disturbance caused by boat propellers and natural disasters. Bathymetry was selected because seagrasses thrive in various depths of water and topography. Furthermore, seagrasses require specific salinity, nitrogen, and other nutrients within their environment, warranting selection of such layers. Finally, we identified disturbance as a driving factor since seagrass populations are found to reestablish after hurricanes, human impact, and other anthropogenic disturbances at slow rates. Following *a priori* identification of this list of factors for determining seagrass habitat suitability, we used the species distribution modeling program Maxent to model the distribution of seagrass habitat along the Texas Gulf Coast. Effective biodiversity management depends upon an understanding of habitat suitability; thus, our work represents an important first step toward the conservation of seagrasses and the ecosystem services they provide.

**010.060 U The effects of ant relationships on Texas Horned Lizard populations**, Corrender Taylor, Hardin Simmons University; Samuel Thompson, Hardin Simmons University; JD Carnes, Hardin Simmons University; Wendi K Wolfram, Hardin-Simmons University; Allan J. Landwer, Hardin Simmons University; Andrea B. Jensen, Hardin Simmons University

The population of Texas Horned Lizards (*Phrynosoma cornutum*) is an important part of the Texas biodiversity. Over the past few years this population

had been declining rapidly. One hypothesis is that the population of Red Invasive Fire Ants (*Solenopsis invicta*) has been attacking, out-competing, and/or killing the lizard's main food source, Red Harvester Ants (*Pogonomyrmex barbatus*). Studies show that as Red Invasive Fire Ants (RIFA) populations increase, the populations of Red Harvester Ants (RHA) and Texas Horned Lizards (THL) decrease. This could be a contributing factor to THL becoming an endangered species. Typically, the equally aggressive RIFA and RHA keep on average a ten-foot gap or more between mounds. However, recently RIFA have been observed building mounds within five feet of, and even travelling over RHA mounds, refraining from attacking one another. We predict the observation of these new ant behaviors will have a positive effect on the re-growth of the THL population. Results from this study will provide essential data and information for wildlife managers and endangered species survival plan coordinators in the ongoing effort to conserve the Texas Horned Lizard.

**010.061 U The effects of the reintroduction of native grasses on native bird populations in West Texas**, Francisco Alberto Velasco, Hardin Simmons University; Bryson Holcomb, Hardin Simmons University; Corrender Taylor, Hardin Simmons University; Wendi K Wolfram, Hardin-Simmons University

West Texas grasslands contain a variety of grass species both native and non-native as a result of agriculture and land clearing. These include such native grasses as: Side Oats Gramma (*Bouteloua curtipendula*), Big Bluestem (*Andropogon gerardii*), Little Bluestem (*Schizachyrium scoparium*), and Indian Switchgrass (*Sorghastrum nutans*), and non-native grasses such as: Buffalo Grass (*Bouteloua dactyloides*). All of these grasses provide habitat and foraging opportunities for multiple avian species. We believe that the reintroduction of native grasses in West Texas, will have a positive impact on the native birds that nest and feed there compared to the non-native grassland habitats. Using sound recorders and visual observations we will compare and record avian species living in West Texas grasslands, and identify differences in population sizes and species in the Runnels County, Texas area.

**010.062 G The Kisatchie Painted Crayfish (*Orconectes maletae*) status in Louisiana**, Jade Lynn Marie McCarley, Department of Biology at the University of Texas at Tyler; Josh Banta, Department of Biology at the University of Texas at Tyler; Kate Hertweck, Department of Biology at the University of Texas at Tyler; John S. Placyk, Jr., Department of Biology at the University of Texas at Tyler; Marsha G. Williams, Department of Biology at the University of Texas at Tyler; Lance R. Williams, Department of Biology at the University of Texas at Tyler

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The Kisatchie Painted Crayfish (*Orconectes maletae*) is an endemic species located within Louisiana and Texas. The species is listed as data deficient by the International Union for the Conservation of Nature. A petition for listing this species under the Endangered Species Act was filed in 2010. Due to the lack of data, the species has yet to be listed. After sampling four historical sites in Louisiana, the species was rare which indicates the increasing absence of the species in these sites. The Texas portion was found to be absent in 60% of its historical range. The goals of this experiment are as follows: 1) determine occupancy of this species in historical localities, 2) create a MAXENT ecological niche model for the Louisiana population and compare to the Texas population, 3) determine population dynamic estimates (reproduction information, sex ratio, and abundance) by performing field sampling, 4) perform mark and recapture using Visible Implant Elastomer Tags, 5) perform Restriction Site Associated DNA Sequencing to investigate population genetic variation across the species range and assemble an entire species genome. These data in their entirety will allow for the United States Fish and Wildlife Service to complete the species assessment. This will allow us to determine the causes of the apparent population decline observed across its range.

Environmental Science

Environmental Science Poster Session

Participants:

010.063 U **Animal movement through Southwestern's EcoLab**, *Zane McDurham, Southwestern University*

Southwestern University has eight motion triggered cameras have been constantly snapping shots of animals throughout the twenty-five acres for almost two full years now, capturing pictures of a variety of different animals throughout each day. This data shows what times of the day and night what animals are active and what they are doing. This also shows what months of the year different animals are more active, and what different animals start to appear in the lab. Up to this point the cameras have found twenty-three different species all spending various times in the EcoLab. Many different species have only been caught on camera one or two times, while many species such as deer and raccoons are photographed multiple times a week. The data I will be collecting and analyzing will come from solely from our GameCams out in EcoLab. The pictures we have give me a good range of time to study the animal movement patterns. Since the installation of the cameras all of the pictures have been sorted into folders titled with the location they were placed in the lab, with this I will easily be able to look at what parts of EcoLab are frequented by what animals.

010.064 U **Mammal trap efficiency verified with trail cameras**, *Danielle D Cain, Schreiner University; Chris Distel, Schreiner University*

Trail cameras were used to determine the trapping efficiency of small to medium-sized native mammals around the inner perimeter of a fenced property located in Kerrville. The efficiency of this form of trapping was determined as the number of captures in relation to visits seen in the images. Spring-loaded live-animal cage traps were placed in nine different locations within the property during fall and spring. Each trap was set similarly in regards to bait, time and day and were checked within 24 hours. While some animals did visit occupied traps we saw no significant effect of the presence of an animal in the trap on the likelihood of another animal visiting.

010.065 U **Roadside edge effects on herbaceous plant communities**, *My Nguyen, Concordia University Texas; Vincent Sherman, concordia University Texas; Hailey Rafferty, Concordia University Texas; Rikki Ray, Concordia University Texas; Mary Kay Johnston, Concordia University Texas*

Human disturbance caused by roads can have significant negative effects on biological communities. In this study, we examined how roads create edge effects in herbaceous plant communities in central Texas. We sought to detect edge effects by surveying plant communities near roadsides using 100m transects. We predicted that the strength of the edge effects was determined by the size of the road, traffic volume, and distance from the road. We found that road size and traffic volume show significant interaction effects for total abundance, straggler daisy abundance, and Simpson diversity, greater than each main effect singly. Small, low traffic roads have higher total abundance, higher straggler daisy abundance, and higher Simpson diversity. This supports other studies which show negative edge effects caused by roads.

010.066 U **The effects of water quality from natural and man-made resources on wildlife and livestock**, *Elizabeth Lopez, Hardin Simmons University; Abbie Housden, Hardin Simmons University; Brittney Poor, Hardin Simmons University; Cassidy Hooper, Hardin Simmons University; Wendi K Wolfram, Hardin-Simmons University*

Poor water quality resulting from agricultural and storm water runoff, domestic, and industrial discharge, erosion, and landfills impact the health of both plant and animals through natural water sources and man-made water developments such as tanks. Very few long-term studies have surveyed the impact of water quality on wildlife and livestock leaving the overall health impact widely unknown and open to speculation on the level of concern. We believe that the health of wildlife will be negatively impacted by the quality of the water found in tanks and natural streams as a result of pesticides, metals, and runoff from rainwater and other sources. In this study, we use water quality tests and hair follicles collected from various mammals to identify potential health impacts of various water

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resources on a ranch in Runnels county, Texas. Data collected from this study can prove beneficial to the development of improved water quality for land management practices centered on both wildlife and livestock.

010.067 N **The Texas Ozonesonde Network**, *Mark Garling Spsychala, St. Edward's University; Gary A. Morris, St. Edward's University; Paul Walter, St. Edward's University*

Since 2004, over 850 weather balloons carrying instruments to measure ozone and meteorological data have been launched as part of a continued effort to provide a high resolution dataset of vertical profiles of important meteorological features and influences on surface air quality at urban and remote sites across Texas. From its start at Rice University in Houston, the Texas Ozone Network has expanded to include 12 partner universities. The data collected as part of this project are freely available for use and have been archived on the St. Edward's University Munday Library website. This presentation provides an overview of the network and data collected, a sample of insights gained from more than a decade of flights, and a look at future sounding products available from this network.

Freshwater Science

Freshwater Science Poster Session

Participants:

010.068 U **Comparison of gut microbiomes between native and invasive viviparids (Gastropoda, Viviparidae)**, *Ernest North, University of Houston Clear Lake; Russell Minton, University of Houston Clear Lake*

Invasive species can be defined as those organisms introduced in areas where they did not evolve. Because of that, they are capable of adapting to biotic and abiotic conditions that can be very different from those found in their native range. In general, successful invaders possess high fecundity, fast growth rate, short generation time, and high genetic variability, traits usually associated with r-selected species. While the ecological and natural history impacts of invasive species are well documented, the role of microbiomes in these interactions has remained relatively unknown. Research has shown that alien species can alter microbiomes significantly in marine and terrestrial systems. We used two species of freshwater viviparid snail, one native (*Campeloma decisum*) and one invasive (*Cipangopaludina japonica*), and analyzed their gut microbiomes using next-generation sequencing of the 16S rDNA gene. We present comparisons of bacterial diversity at varying taxonomic levels and identify diagnostic taxa for each snail species. We also propose potential physiological differences between species' microbiomes that may give the invasive species an advantage in non-native habitats.

010.069 U **Investigating whether freshwater amphipods discriminate between quality and quantity for habitat preference**, *Fiorella Hernandez, St. Edward's University*

Rational choice theory is an economic principle that states individuals always make logical decisions when presented with different choices. When faced with choices, the option that permits the most benefit will be chosen instead of the more "irrational" choice. This rationality theory has been tested repeatedly in humans and, interestingly, when presented with a decoy choice, a choice less optimal than the options offered previously, they will make the "irrational" choice. Amphipods, small crustaceans that serve as the base of the food web, are good bioindicators for the health of aquatic ecosystems. For this reason, their habitat selection is important to understand. Previous experiments conducted in our lab have shown that amphipods' preferred habitat is algae but they also live in coontail and other aquatic plants. However, not enough information was known to determine whether amphipods prefer quantity of habitat versus quality and whether or not their preference changes. To find out amphipods' preference, we conducted an experiment using four conditions repeated 10 times each. The weight of algae was consistent throughout each condition while the coontail was the increasing variable. One amphipod was put in each condition and given 24 hours to choose between the algae and the coontail. Results indicated the threshold of switching from quality of habitat to quantity is twice as much coontail than algae. This information is now being used to conduct a rationality theory experiment to test amphipod's choice of quality versus quantity of habitat.

010.070 U **The effect of alternative mating on sperm competition in coercive livebearing fish**, *Briana Martinez, St. Edward's University; Raelynn Deaton Haynes, St. Edward's University*

The objective of the experiment was to determine if exposure to males of different sizes would lead to alternative reproductive strategies associated with sperm plasticity in the coercive western mosquitofish, *Gambusia affinis*. This study provided a unique opportunity to investigate the evolution of ejaculation as a result of sperm competition because males vary substantially in body size and, as a result, exhibit alternative mating strategies. In a previous study on *Xiphophorus nigrensis*, commonly known as swordtails, it was confirmed that alternative mating tactics result in sperm plasticity. However, it was unknown if alternative reproductive strategies affect sperm plasticity in *Gambusia affinis* that mate coercively regardless of body size. In order to measure sperm plasticity, three treatment groups were exposed to males of varying sizes, and after several days sperm was collected from each focal male. The data collected from the study is in the process of analysis and will be reported. We predict that small parasitic males will

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increase the number of sperm produced when placed around a larger male. Future studies will aim at determining if the properties of the sperm are dependent on competition, and the physiological mechanisms by which sperm plasticity can be achieved.

Geosciences

Geosciences Poster Session

Participants:

**010.071 U Analyzing LiDAR slope data to create geologic maps**, *Joshua Adam Reinhart, Wayland Baptist University; Tim Walsh, Wayland Baptist University*

Slope data derived from a LiDAR dataset was analyzed to create a geologic map based on erosion patterns. The research area is located in south east New Mexico in the western extent of the Guadalupe Mountain range. The strata found in this region are similar to that exposed along the eastern edge of the Guadalupe Mountains. This project focused on the western escarpment that is primarily in the Pinon Ranch Quadrangle. Background research over the study area was conducted and various digital maps were downloaded (topographic, geologic, etc.). The LiDAR bulk data was obtained from the OpenTopography web site and imported to an Arc GIS system. From this basic data elevation chloropleth maps and a 3-D TIN model were created and analyzed in order to better understand the area. With these maps Slope Class-Breaks of grouping by degrees of slope were then manually determined using topographic slope data compared to descriptions of local geology. A geologic map was then built using the class breaks as a proxy for formations and members. This highlighted the ridge line of the Rio Bonito Member which has the steepest slopes in the study area. A trip was then made to the study area to ground truth the multiple maps that were created in the lab. Field observations found that the initial LiDAR slope mapping hypothesis generally holds true. Other factors such as vegetation type and drainage patterns are also being evaluated as indicators of underlying geology that can be examined with LiDAR.

**010.072 N Dust emissions from saltation bombardment of salt efflorescences**, *Robert Scott Van Pelt, USDA Agricultural Research Service; Guoming Zhang, Beijing Normal University*

Soluble salts resulting from weathering of geological materials often form surface crusts or efflorescences in areas with shallow saline groundwater. In many cases, the affected areas are susceptible to wind erosion due to their lack of protective vegetation and their flat topography. Fugitive dusts containing soluble salts affect the biogeochemistry of deposition regions and may result in respiratory irritation during transport. We created efflorescent crusts on soil trays by surface evaporation of single salt solutions and bombarded the resultant efflorescences with quartz abrader sand in a laboratory wind tunnel. Four replicate trays containing

a Torrifluent soil affected by one of nine salts commonly found in arid and semiarid streams were tested and the emissions were captured by an aspirated multi-stage deposition and filtering system. We found that in most cases the efflorescent crust reduced the soil surface erodibility but also resulted in the emission of salt rich dust. Two of the salts, sodium thiosulfate and calcium chloride, resulted in increased soil volume and erodibility. However, one of the calcium chloride replicates was tested after an outbreak of humid air caused hygroscopic wetting of the soil and it became indurated upon drying greatly decreasing the erodibility. Although saline affected soils are not used for agricultural production and degradation is not a great concern, the release of salt rich dust is an area of environmental concern and steps to control the dust emissions from affected soils should be developed.

**010.073 N Geochemical variation in spring chemistry as evidence for a mixed fluid aquifer; Fort Hood Military Installation, Texas**, *Kaleb J. Henry, Stephen F Austin State University; Mindy Faulkner, Stephen F Austin State University*

The Owl Mountain and Nolan Creek provinces are dissected karst plateaus in the eastern section of the Fort Hood Military Installation. The installation contains surficial exposures of carbonate strata from the Lower Cretaceous Trinity and Fredericksburg groups and is underlain by the Edwards and Trinity aquifers. The Owl Mountain and Nolan Creek provinces are characterized by rugged terrain with steep slopes and incised canyons, and are delineated to the north and south by the installation boundary, the Live Fire Impact Range to the west, and Belton Lake to the east. These provinces are utilized by the United States Army for troop maneuvers and training; some parts have been extensively modified by training exercises and road building, more remote areas are set aside as grazing land, endangered species habitat, and recreational areas for military families. As part of the U.S. Army's quest to catalog and manage the natural resources in these training areas, the Fort Hood Natural Resources Management Branch requested baseline physicochemical and geochemical data regarding subaerial springs in the Owl Mountain and Nolan Creek provinces. Seven subaerial springs were monitored monthly over a two-year period for physicochemical parameters and ionic concentrations. These data were used to propose a hydrogeologic model for a mixed fluid aquifer and groundwater migration through varying permeabilities of the inter-fingering Comanche Peak and Edwards carbonates.

**010.074 G Petrographic and micro-facies analyses of the Fort Terrett Formation of the Lower Cretaceous Edwards Group, In Kimble County, Texas**, *Richard Urwin, Stephen F. Austin State University*

The Fort Terrett Formation was deposited on the

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western edge of the Comanche Shelf in central Texas. The predominate lithology of the Fort Terrett Formation is limestone which caps the hills that surrounding Junction, Texas. Deposition of the Fort Terrett Formation occurred within shallow, quiet waters during the Lower Cretaceous. Rose (1974) developed a general stratigraphic correlation and lithostratigraphic framework for the Cretaceous shelf and established a regional correlation. Four stratigraphic divisions have been recognized in the Fort Terrett Formation. These are: a basal nodular unit, a burrowed unit, a dolomitic unit, and the Kirschberg evaporites. In the Junction area, measured sections by Rose (1974) of the Fort Terrett Formation contain the lower two units which are the burrowed unit, distinguishable by bioturbation, and the dolomitic unit. This study has divided the Fort Terrett Formation into micro facies in the Junction area to determine smaller order sequences. Nine sections of the Fort Terrett Formation were measured along road cuts on I-10 near Junction, Texas and hand samples collected. This data was used to divide the Fort Terrett Formation into two lithostratigraphic units. The lower unit contains extensive chert nodules and fossils that indicate a shallow water shelf. The upper unit contained thick-bedded limestone representing an open carbonate shelf.

**010.075 G Petrographic and stratigraphic analysis along the Lower Cretaceous strata, in Kimble county Texas,** *Austin C Wilkerson, Stephen F. Austin State University*

In the Kimble County area, the upper Trinity Group is predominantly a carbonate system with minor clastic couplets that were deposited during the Middle Cretaceous in the south Llano Uplift region. Stratigraphic units of the upper Trinity Group are the Hensel Formation, determined to be supratidal claystones, the Glen Rose Formation, which are mudstones that were deposited in a carbonate lagoon, and the Walnut and Fort Terrett formations, which are wackestones to packstones interpreted to have been deposited on a shallow carbonate shelf. Nine stratigraphic sections were measured along Interstate 10 and U.S Highway 377 in Kimble County, Texas to analyze the lithostratigraphy, sequence stratigraphy, petrography, and paleotologic deposition. The upper Hensel Formation contact with the Lower Glen Rose Formation is based on the uppermost red bed of the Hensel Formation, forming the first sequence. Sequence 2 begins at the mudstones atop of the Hensel Formation and end at the burrowed mudstone unit. This forms the Glen Rose Formation. Sequence 3 extends from claystones atop of the burrowed unit of the Glen Rose Formation and terminates at the disconformable contact with the Fort Terrett Formation. It represents the Walnut Formation. Petrographic study of the Hensel, Glen Rose and Walnut formations indicate that marine diagenesis has altered all units present. Common bivalves in the above the Glen Rose Formation were

*Cerastoreon texana*, which are index fossils for the Walnut Formation and provided evidence for the placement of the Walnut Formation above the Glen Rose Formation in Kimble County, Texas.

**010.076 G Regional stress regime study of East Texas using orientation of fractures in the Weches Formation,** *Cory Dean Ellison, Stephen F. Austin; Chris Barker, Stephen F. Austin*

Fractures in the Weches Formation in a roughly 50 mile radius around Nacogdoches, Texas were documented and analyzed using data obtained at various outcrops. This data was used to infer the direction of horizontal stresses that created the fractures. These joints are typically steeply dipping (700 – 900) and iron filled. Crack-seal formation, steep dip and a lack of shear movement suggests these fractures were predominantly opening mode joints. Slickenlines are visible on some fracture planes; however, their bearings show random orientation indicating unloading movement during erosion. Limonite veins and iron ledges are a late stage diagenetic event which indicates a late origin for fractures during exhumation. Orientation data of 540 fractures from 14 different outcrops show three main joint sets: N75-85W, N75-85E, and N40E. These sets stretch over distances of up to 90 miles. These orientations are believed to be the result of late tertiary to recent stress states caused by local faulting, Gulfward extension, and extension into the East Texas basin. These trends indicate a regional roughly east-west direction of maximum horizontal stress that changes gradually from the east, where it points N75-85W, to a more northeasterly direction closer to the East Texas basin. Until now previous fracture have used borehole samples rather than outcrop. These results show similar trends to other fracture analyses in East Texas supporting previous studies that show there is quaternary movement of faulting near the East Texas basin and that present day Gulfward extension has an effect on the stress regime in East Texas.

Mathematics and Computer Science

Mathematics & Computer Science Poster Session

Participants:

**010.077 U Modeling trends for Texas traffic accidents,** *Victoria Gore, Southwestern University*

Analysis of yearly traffic accident data in Texas reveals trends in the numbers of both fatal accidents and non-fatal accidents. Box and whisker plots of accidents per hour of the day show that nonfatal accidents increase in during the both morning and afternoon rush hours, but fatal accidents are lower relative to the rest of the day during both those times. The number of traffic accidents varies by the day of the week. On weekends, nonfatal accident rates are lower but fatal accidents are higher.

**010.078 U The impact of accommodated vehicle to vehicle communication,** *Dominic Carrillo, Sul Ross State University*

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In the 21st century, American daily lives consist of taking a risk by doing nothing more than stepping into a vehicle and driving to work. The National Highway Traffic Safety Administration (NHTSA) reported an estimated 6.3 million vehicle crashes nationwide in 2015. While researchers in the automotive industry have made passenger safety a priority, in today's vehicles there is a lot of ground to cover. Vehicle to vehicle (V2V) communication is a system where vehicles send messages to each other about their GPS coordinates, speed, and other factors to calculate the potential of a collision. Even though studies are still in progress, research shows that V2V technology has the ability to decrease collisions by gathering information from other vehicles through a communication network in real time and acting on that data. V2V technology addresses human error in driving and provides a safety monitor to warn drivers of potential collisions. This study offers a design of a simulation that demonstrates the impact of public involvement with vehicles accommodated with the V2V safety feature, potentially creating a safer road system.

Neuroscience

Neuroscience Poster Session

Participants:

**010.079 U Cerebral hemodynamic effects of transcranial infrared laser stimulation measured with functional near-infrared spectroscopy**, *Emma Holmes, University of Texas at Austin; Douglas W. Barrett, The University of Texas at Austin; F. Gonzalez-Lima, The University of Texas at Austin*  
Transcranial infrared laser stimulation (TILS) is a novel, safe, non-invasive treatment that increases brain energy metabolism by increasing blood flow, blood oxygen content, and the enzymatic activity of cytochrome oxidase via photonic energy absorption. Our group has previously shown that TILS can result in improvements in cognitive performance in healthy adults, in terms of sustained attention (as measured by the psychomotor vigilance test, or PVT) and visuospatial short-term memory (as measured by the delayed match-to-sample task, or DMS). To explore the brain metabolic mechanisms by which this enhancement in performance occurs, functional near-infrared spectroscopy (fNIRS) was used to measure changes in oxygenated and deoxygenated hemoglobin as a result of both TILS and behavioral testing with PVT and DMS tasks. fNIRS is a safe, non-invasive way of indirectly monitoring brain activity, by transmitting two wavelengths transcranially and measuring the amount of light that reaches nearby detectors. The two wavelengths correspond to the absorption spectrum of oxygenated and deoxygenated hemoglobin, respectively. Hemodynamic responses in healthy participants were assessed with fNIRS at baseline, and during the PVT and DMS tasks. TILS was administered next, and fNIRS was used again immediately after TILS, and again during PVT and

DMS. Data collection and analysis is ongoing. This experimental design will allow the decomposition of brain metabolic effects into those due to functional activation from PVT/DMS tasks, those due to TILS, and any interactions between the two. This approach may be used to monitor the successful effects of laser stimulation on cerebral oxygenation.

**010.080 G Cytokine concentration changes in selected brain regions of adjuvant-induced Rheumatoid Arthritis Lewis Rats**, *Han Yang,*

*University of the Incarnate Word; Amelia J. Stinson, University of the Incarnate Word; Carlos A. Garcia, University of the Incarnate Word*

Rheumatoid arthritis (RA) is a chronic autoimmune disease which can cause inflammation in joints, bone damage, as well as disability. A reported symptom of RA includes cognitive dysfunction. This study aimed to measure brain inflammatory markers in an adjuvant-induced Lewis Rat model of RA. Age- and sex-matched rats (n=16) were separated into 2 groups: control and RA. Arthritic intensity was scored based on physical examination of the four paws. Twenty-eight days after the adjuvant injection, groups were sacrificed and the frontal lobe of the cerebral cortex, hippocampus, hypothalamus, amygdala, and cerebellum dissected using the stereotaxic atlas of Paxinos and Watson as a guide. Pro-inflammatory cytokines IL-1 $\beta$ , IL-6, and IL-23, and the anti-inflammatory IL-10 were measured by enzyme-linked immunosorbent assays (ELISA) in tissue homogenates. The results indicate RA significantly ( $p < 0.05$ ) increased the concentration of pro-inflammatory cytokines and the anti-inflammatory cytokine IL-10 in the amygdala and cerebellum. IL-6 increased in the cerebral cortex, hippocampus, and hypothalamus with a concomitant decrease in IL-10. These data provides evidence that adjuvant-induced RA alters the inflammation status of these brain regions. The results are useful in the development of novel drug therapies for the millions of RA patients at risk of developing mood changes, memory loss, and other cognitive deficits.

**010.081 U Determination of expression of *c16orf52* homologs**, *Emily CAROLINE Camara, University of Texas at Tyler; Brent R Bill, University of Texas at Tyler*

Individuals diagnosed with an autism spectrum disorder (ASD) have difficulty with social interactions and display repetitive behaviors or restricted interests. ASD is a heterogeneous set of neurodevelopmental disorders with complex etiology. A strong genetic component has been demonstrated through the identification of various mutations within individuals with ASD. In humans, deletions in the *C16ORF52* gene have been shown to cause neurodevelopmental disorders. Two homologs of this gene (*c16orf52a* and *c16orf52b*) have been identified in *Danio rerio*. Zebrafish is a highly genetically malleable system and has been



demonstrated as a useful model for ASD. In previous work from our lab, we determined that *c16orf52a* was expressed at all time points in embryonic development. In addition, a novel micro-exon associated within *c16orf52a* gene was identified via genetic sequencing. Our goal was to better characterize the expression of the *c16orf52a* micro-exon and *c16orf52b* paralog. To do this, RNA was extracted from zebrafish embryos at various developmental time points and the expression of these genes was determined using RT-PCR. ASD are associated with alterations in micro-exon inclusion within neuronally expressed genes; therefore, we propose that spatial expression of this gene and micro-exon inclusion will be critical to proper brain development.

**010.082 G Enhanced expression of fragile X mental retardation protein in malformative lesions of patients with focal cortical dysplasia**, *Conner Douglas Reynolds, University of North Texas Health Science Center; Suzanne O Nolan, Baylor University; Gregory D Smith, Baylor University; Taylor Jefferson, Baylor University; Samantha Hodges, Baylor University; Joaquin N Lugo, Baylor University*  
Focal cortical dysplasia (FCD) accounts for nearly half of all cases of medically refractory epilepsy in the pediatric and adult patient populations. This disorder stems from localized malformations in cortical brain tissue due to impaired neuronal proliferation, differentiation, and migration patterns. Recent studies in animal models have highlighted the potential role of the Fragile X Mental Retardation Protein (FMRP) expression in FCD. Despite this evidence, there has been no investigation into whether this effect is similarly observed in human patients. The purpose of this study is to investigate FMRP expression within localized malformative lesions of patients with FCD. This study also investigates protein expression within the PI3K/Akt/mTOR and canonical Wnt signaling pathways, which have known involvement in epilepsy and interactions with FMRP. Pathologic tissue from malformative lesions of FCD patients with refractory epilepsy were compared to relatively normal control tissue from patients with intracranial neoplasms. A series of western blotting assays were then performed to assess FMRP, as well as key proteins in the PI3K/Akt/mTOR and canonical Wnt signaling pathways. There was reduced S235/236-phosphorylated S6, GSK3- $\alpha$ , and GSK3- $\beta$  protein expression in FCD patient tissue. These patients also expressed significantly greater total and S499-phosphorylated FMRP. Taken together, these findings confirm our hypothesis that malformative lesions of patients with FCD display changes in FMRP expression, as well as dysregulation of both PI3K/Akt/mTOR and canonical Wnt signaling. These novel clinical findings extend previous work in animal models, further suggesting an unforeseen role of FMRP in the pathophysiology of FCD and refractory epilepsy.

**010.083 U Generating a *grin1a* mutation in Zebrafish**, *Sahir Burkie, The university of Texas at Tyler; Brent R Bill, University of Texas at Tyler*  
The gene *grin1a* encodes the NR1.1 subunit of the NMDA ionotropic glutamate receptor. This receptor plays fundamental role in the molecular processes of learning and memory in many animals. Furthermore, mutations and polymorphisms in this gene have been associated with schizophrenia. Animal models greatly facilitate the analysis of gene functionality; unfortunately mice with null mutations die prenatally. The zebrafish provides a unique opportunity, as a partial genome duplication led to two GRIN1 homologues, (*grin1a* and *grin1b*). The goal of this work is to utilize the CRISPR/Cas9 system to generate a *grin1a* null mutant in zebrafish. In addition, to facilitate rapid genotyping, we will replace the third exon with a blue fluorescent protein. We designed potential guide RNAs, synthesized them using T4 polymerase primer extension, and transcribed the guides and Cas9 using in vitro transcription. Initial injections of the CRISPR/Cas9 RNAs have been initiated, and we are currently screening for mutations by PCR. Once mutations are identified, phenotyping will begin at the morphologic and behavioral level.

Physics and Engineering

Physics & Engineering Poster Session

Participants:

**010.084 U Conductivity of CsH<sub>2</sub>PO<sub>4</sub> and SiO<sub>2</sub> composites under ambient and humid conditions over time**, *Sonam Lhamo, UTEP; Andrea Montgomery, UTEP; Israel Martinez, UTEP; Alex Price, UTEP; Cristian Botez, UTEP*

Cesium Dihydrogen Phosphate (CDP) is a well-studied solid state protonic conductor for hydrogen fuel cell electrolyte applications at intermediate temperatures (235°C). CDP exhibits very high protonic conductivity at intermediate temperature which makes it a very good protonic conductor. However, at the temperature that CDP begins to exhibit high protonic conductivity, it begins to chemically decompose in the absence of humidity. Silicon dioxide (SiO<sub>2</sub>) is known for its hygroscopic properties and has been used in several applications where water absorption is required. CDP was prepared and characterized with powder x-ray diffraction. Composites of 0.8 CsH<sub>2</sub>PO<sub>4</sub>/0.2 SiO<sub>2</sub> were synthesized by mechanically dry mixing CDP with nano-silica powder and pressing it into pallets. Electrochemical impedance spectroscopy was carried out over the span of 10 hours at isotherm (260°C) under both dry and humid conditions for all pellet samples. After 10 hours, conductivity values of pure CDP measured at 6.18x10<sup>-5</sup> Scm<sup>-1</sup> in dry conditions and 8.37x10<sup>-4</sup> Scm<sup>-1</sup> in humidity. The composite demonstrated conductivity at 1.768x10<sup>-3</sup> Scm<sup>-1</sup> and 2.69x10<sup>-3</sup> S cm<sup>-1</sup> in dry and humid conditions, respectively.

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010.085 U **Creating a wave-powered robot**, *Christine Nissen, Southwestern University*

In 2008 a 9.5-meter catamaran, the Suntory Mermaid II, traveled from Honolulu, Hawaii to Wakayama, Japan using two fins that converted wave energy into forward motion. Despite the success of this Wave Devouring Propulsion System (WDPS), little has been published about how it works. The goal of this project was to create a working model based on this method, and to analyze its performance. A wave-powered boat design would be ideal for a sensor platform that could travel over a wide area for an extended period without refueling.

010.086 G **Stabilization over time of CsH<sub>2</sub>PO<sub>4</sub> conductivity by using propyl sulfonic acid functionalized silica under ambient and humid conditions.**, *Israel Martinez, UTEP; Cristian Botez, UTEP; Alex Price, UTEP; Andrea Montgomery, UTEP; Sonam Lhamo, UTEP*

Cesium Dihydrogen Phosphate (CDP) show a sudden, 1000-fold jump in protonic conductivity at when heated up to ~235°C from room temperature. However, CDP experience a chemical decomposition into a nonconductive oxide at the same temperature threshold. Propyl Sulfonic Acid Functionalized Silica (PSAFS) is a well-known strong cation exchanger for polymers. A mechanical mixture based on a mole fraction of 0.7 CDP to 0.3 PSAFS was prepared for Electrochemical Impedance Spectroscopy (EIS) under ambient and humid conditions. EIS measurements were taken from 200°C to 260°C with a heating ramp of 2.5 °C/min every 10 degrees and the sample was held at 260°C for 20 hours. While at isotherm, impedance data was collected every hour. Conductivity values for the composite at hour 20 were 1.296 x10<sup>-04</sup> Scm<sup>-1</sup> in ambient conditions, and 2.11 x10<sup>-03</sup> Scm<sup>-1</sup> under humid conditions. Neat CDP produced values of 7.14 x10<sup>-07</sup> Scm<sup>-1</sup> and 5.86 x10<sup>-06</sup> Scm<sup>-1</sup> in ambient and humid conditions respectively. Over a time study of 20 hours the composite outperformed neat CDP with respect to time in both ambient and humid conditions.

010.087 G **The inverse and direct Hofmeister series of Hen egg lysozyme at pH below isoelectric point (pI) as seen by SAXS**, *Pawan Koirala, University of Texas at El Paso; Jose L. Banuelos, University of Texas at El Paso*

Protein interaction and aggregation processes are important in understanding many physiological processes in living organisms. Diseases such as Alzheimer's, Creutzfeldt-Jakob and Parkinson's are associated with protein or peptide aggregation phenomena whereas the short-range order of crystalline proteins contributes to eye lens transparency benefitting our visual system. We are focused on determining the shape, size, and nature of interactions between the protein molecules (lysozyme) in solution at low and high salt concentration of various sodium salts at

certain pH by using Small-angle X-ray scattering (SAXS). Results show that for protein at 10mg/ml and 200mg/ml the shape and size of the protein is spherical with radius 15.5 Å and 16.7 Å respectively. At 60mg/ml with 0.1M sodium salt, the shape and size of the protein is ellipsoidal with the average polar radius of 38.5 Å and equatorial radius 15.5Å. There is no interaction among proteins at 10mg/ml and 60mg/ml whereas at 200mg/ml we see a coulomb repulsive interaction with effective radius 20.3 Å. The variation of the polar radius of protein at 60mg/ml at pH 9.0 with 0.1M of various Hofmeister sodium salts (SO<sub>4</sub><sup>2-</sup>, F<sup>-</sup>, Cl<sup>-</sup>, Br<sup>-</sup>, NO<sub>3</sub><sup>-</sup>, I<sup>-</sup>, SCN<sup>-</sup>) shows an elongation of the protein as we go from left to right in the Hofmeister series. We are currently focusing on determining the mechanism of elongation and impact on aggregation of the protein induced by Hofmeister salts.

Science Education

Science Education Poster Session

Participants:

010.088 U **Enhancing understanding of essential organic nomenclature for second semester general chemistry students**, *Cassandra Orozco, University of Texas at El Paso; James E. Becvar, University of Texas at El Paso; Mahesh Narayan, University of Texas at El Paso*

In the second semester of general chemistry, students receive an introduction to organic chemistry. A strong foundation in learning starts with the ability to correctly name organic compounds. Our proposed strategy involves the identification of the parent chain, the recognition of resident functional groups, and the ability to discern/indicate the correct isomer if any, etc. Accurately naming an organic compound is essential to understanding of its properties; to success in Organic Chemistry 1 and 2; and, for a career as a Chemist in academia, industry or in government agencies. We propose a modular toolbox that facilitates compartmentalization of the nomenclature process of organic compounds and helps the student adequately identify all structural elements present in an organic compound. The advantages of our procedure is discussed using examples to illustrate the process.

010.089 G **Inquiry science teaching professional development course for Biology graduate students**, *Ykevaa Tyree-Khari Hunt, Texas State University; Julie F. Westerlund, Texas State University*

In this study, we examined the perceptions of 49 biology graduate students towards traditional science, non-traditional science and science education using a pre/post survey design (Pomeroy, 1993). The survey included a 39-item Likert-like scale questionnaire and an open response section. The survey respondents were students in a one credit graduate inquiry science teaching course that incorporated philosophy and nature of science topics. All students were required to take the course for professional development in order to be

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teaching assistants. The purpose of the study was to determine if the course that had students prepare and present inquiry science lessons had an effect on their perceptions in these areas. The students were also analyzed by gender, previous research or teaching experience and previous coursework in the philosophy of science. The study has relevance for science education since it concerns the professional development of the future professoriate. Inquiry science is one of the recommended methods for effective science teaching at the secondary school level (NSES, 1996) and at the biology undergraduate level (Vision & Change, 2013). The inquiry science professional development course will be described and the results from both the survey and the open-ended sections will be presented and discussed.

**010.090 Workbooks enhance learning in peer-facilitated instruction**, *Alejandra Belmont, University of Texas at El Paso; Ashley Priego, University of Texas at El Paso; Ashley Baker, University of Texas at El Paso; Mark Smith, University of Texas at El Paso; Mahesh Narayan, University of Texas at El Paso; Geoffrey Saupe, University of Texas at El Paso; James E. Becvar, University of Texas at El Paso*

Incorporating Peer-Led Team Learning (PLTL) into a course curriculum significantly facilitates student learning. However, financial sustainability often presents a very real barrier to PLTL longevity and success at an institution. Another difficulty is creating a well-structured and efficient week-by-week sequence for PLTL workshop content. At the University of Texas at El Paso, "PLTL Workshop Workbooks" (authored by students and giving them publication credit) overcome these problems. Tailored to compliment the General Chemistry 1 & 2 lectures, Workbooks required for workshop serve as a source of content/explanations, quizzes, practice problems, self-assessment, and in-depth explorations of chemistry. They structure lesson plans, ensuring an even pace across all peer-led workshops. Workbooks provide quality content for students to learn. A non-profit organization owns this intellectual property, publishes the workbooks, and donates all profits from sales to fund and sustain the peer leading program, ensuring that students reap the benefits that the PLTL program provides.

Terrestrial Ecology and Management

Terrestrial Ecology Poster Session

Participants:

**010.091 U Activity patterns of White-tail Deer (*Odocoileus virginianus*) in an urban ecosystem**, *Lindsey Settles, East Texas Baptist University; Troy A Ladine, East Texas Baptist University*  
Activity patterns of white-tail deer (*Odocoileus virginianus*) were investigated in an urban ecosystem. The study occurred on the East Texas Baptist University Environmental Studies Area (EnStA) from

14 October 2014 to 30 November 2017. The EnStA is located in Marshall, TX (32<sup>o</sup>33'N; 94<sup>o</sup>22'W) and is bordered on the east by private homes and a cemetery, on the north by a five-lane highway, and on the south by the athletic fields of East Texas Baptist University. Hunting is not allowed on the site as this area is located entirely within the Marshall city-limits. Thus, one objective of our study was to investigate if the non-hunted urban population varied its activity seasonally in relation to hunting season outside of the city limits. A second objective was to investigate activity in relation to selected climatic variables of temperature (minimum, maximum, daily mean temperature) and precipitation. We also investigated the possibility of activity changing in relation to lunar phase. Results of our study indicated that the present population was generally crepuscular in its behavior with a nocturnal shift during the full moon of the lunar phase.

**010.092 N A preliminary examination of the insect biodiversity in the Headwaters Sanctuary**, *David Starkey, University of the Incarnate Word*

As the human footprint expands, and populations grow larger, habitats once occupied by plants and animals are being threatened or destroyed. As a result, we are losing critical habitat and the organisms that occupy those habitats. Therefore it is critical that we understand, and identify, the biodiversity in these areas before it is lost forever. The Headwaters is a 53-acre urban sanctuary adjacent to UIW in San Antonio, Texas. Two previous short-term studies, targeted at understanding the biodiversity of plant and animal species, had been conducted. These studies documented a variety of plants and animals, including several migratory bird species. However a critical component was not addressed – the biodiversity of insects. Insects are critical to ecosystem function in a variety of roles e.g., aerating the soil, pollination and pest control. To address this shortcoming, we began sampling insects in the summer of 2017 using multiple trapping methods. These efforts resulted in the collection of insects representing 7 Orders and 18 families. The most widely represented Orders were Coleoptera (7 families), Homoptera (4 families), and Hemiptera (3 families). In order to gain a better understanding of the insect biodiversity at this site, sampling efforts will continue through the summer of 2018.

**010.093 N Characterization of the bacterial flora of Sorcerer's Cave, the deepest cave in Texas**, *Joshua M. Brokaw, Abilene Christian University; Hannah Seah, Abilene Christian University; Samantha N. Studvick, Abilene Christian University; Diana P. Desai, Abilene Christian University*

At 558 feet, Sorcerer's Cave in Terrell county is the deepest cave in Texas. Because great depth is expected to comprise unique and isolated habitats, bacteria samples were collected for identification and

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characterization. Previous research from portions of this site led to the identification of *Pseudomonas* as the main genus of the bacteria collected. In this study we selectively sampled other bacterial genera to test for different species from a side wall of Sorcerer's Cave near Guano Lake. Samples were collected aseptically and inoculated on 15 ml slants of TSA with screw caps. The isolates were kept cold until incubation and incubated at room temperature until growth appeared. We performed PCR of the 16S rRNA gene using the 27f and 1492r primers and obtained 16S DNA sequences. We performed preliminary identification of 16S sequences through comparisons with accessions from Genbank and the Ribosomal Database Project. In addition to the ecological characterization of the microbial flora in Sorcerer's Cave, this research project is the precursor to further studies of the bacterial isolates, including antibiotic resistance testing.

010.094 U **Effects of *Melanaphis sacchari* (Hemiptera: Aphididae) on the development and growth rate of *Coleomegilla maculata* (Coleoptera: Coccinellidae)**, Brad Burden, Texas A&M University - Central Texas; Laura Weiser Erlandson, Texas A&M University - Central Texas

The sugarcane aphid, *Melanaphis sacchari* (Hemiptera: Aphididae), is a major agricultural pest that feeds on sorghum in the United States and Mexico. As with most invasive pests, it was introduced without its natural enemies. Coccinellids, commonly found in agricultural systems, are generalist predators of aphids.

*Coleomegilla maculata* (Coleoptera: Coccinellidae), a common lady beetle, feeds upon *M. sacchari* and may be a potential agent for biological control in sorghum fields. In this study, we quantified the development and growth rate of *C. maculata* on an *ad libitum* diet of either *M. sacchari* or the common pea aphid, *Acyrthosiphon pisium* (Hemiptera: Aphididae). Data recorded included daily measurements of larvae, developmental time for each life stage, and size (length and width) of adults. *Coleomegilla maculata* was able to complete its full life cycle on a diet of *M. sacchari*. Evaluation of the effects of *M. sacchari* on the growth and development of *C. maculata* will help determine its efficacy as a biological control agent of the sugarcane aphid.

010.095 N **Feeding rates of natural enemies on the sugarcane aphid, *Melanaphis sacchari* (Hemiptera: Aphididae)**, Laura Weiser Erlandson, Texas A&M University - Central Texas; Brad Burden, Texas A&M University - Central Texas; Kaitlyn Liane Clark, Texas A&M University - Central Texas

The sugarcane aphid, *Melanaphis sacchari* (Zehntner) (Hemiptera: Aphididae), is an invasive pest that was first found in the continental United States in 1977; it is now found in 17 states and over 400 counties in the United States. It has become a key economic pest of grain sorghum. Current management of this pest is

through the use of insecticides, which not only kill the aphid but natural enemies as well. Although the sugarcane aphid was introduced without its natural complement of enemies, there are native natural enemies present in sorghum including several species of lady beetles. We examined the feeding rates of five species of lady beetle adults and larvae on the sugarcane aphid using "no choice" tests. Individual coccinellids were exposed to a low or high density of sugarcane aphids and allowed to forage for 24 hours. Each coccinellid species readily consumed sugarcane aphids during the 24 hour period. *Coleomegilla maculata* (Coleoptera: Coccinellidae) larvae consumed the highest number of aphids/cm<sup>2</sup> leaf area. Future research will examine the preference of lady beetles to the sugarcane aphid using choice tests as well as the effects of *M. sacchari* feeding has on the life history characteristics of natural enemies.

010.096 G **Life history of the perforate dome, *Ventridens demissus* (Gastropoda: Zonitidae)**, Adrian Medellin, University of Houston Clear Lake; Russell Minton, University of Houston Clear Lake

Life history studies involve the research and observation of organisms, their traits, and reproductive strategies. These studies are significant in gathering evolutionary and ecological information on target species and their environments. In this study, we present life history data from the perforate dome, *Ventridens demissus*, a widespread zonitid land snail found from Pennsylvania south to Florida and across the Gulf Coast into Texas. Using populations collected in Seabrook, TX, we present data on internal and external shell morphology, shell strength, reproductive behaviors, and egg size. Additionally, we use metagenomics to analyze gut contents to determine the diet of *V. demissus*. Our data will contribute directly to gaps in terrestrial gastropod biology by observing and describing life history parameters of the perforate dome.

010.097 U **Loggerhead Shrike predation**, Morgan Seiler, Sul Ross State University; Sean Graham, Sul Ross State University

The loggerhead shrike (*Lanius ludovicianus*) is a predatory passerine found throughout the United States. These birds are well known for their tendency to impale prey on sharp objects, allowing easy assessment of their predatory tendencies without disturbing the birds. We conducted a weekly inventory of prey items taken by loggerhead shrikes over the course of a year to analyze prey preference, impaled prey turnover rate, and to test whether shrikes leave prey as territorial markers. We surveyed a shrike larder that consisted of a mile length of barbed wire fence along a rural road in west Texas. Once a week we noted what types of prey were found on the fence and how often specific prey items were still present during the next survey; all prey specimens present were collected once a month for further

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analysis. A grid system and photos were used to keep track of impaled prey along the barbed wire fence. Prey were more frequently found in the fall and early winter months and begins to wane during nesting and breeding season, which is inconsistent with the hypothesis that prey items are used as territorial markers. Only 1% percent of the prey was left on the fence over the course of a month, suggesting a rapid turnover rate for prey impaled on the barbed wire fence. These results suggest that most prey are primarily impaled for temporary storage and are removed for complete consumption within a month.

**010.098 U Preliminary colony density estimates and spatial analyses of harvester ants at Rolling N LLP properties, Runnels County, Texas, Alexis Skiles, Hardin-Simmons University; Alyssa Brooks, Hardin-Simmons University; Kenneth Davis, Oregon Institute of Technology; Rick L Hammer, Hardin-Simmons University; Andrea B. Jensen, Hardin Simmons University**

Harvester ants are widespread and can be locally abundant in western North America. They are important in ecosystems because they can impact vegetation, soils, and other animals. Due to their granivory and nest construction, harvester ants denude vegetation, affect soil seed banks, and disrupt plant community structure. Harvester ant colonies have been identified over the course of three years at three sites on ranchland owned and operated by Rolling N LLP Properties. The ranch is a site undergoing native grassland restoration. The three sites include a monoculture site, a restored native grass site, and a mixed vegetation site. Estimates of colony density were compared among the three sites. Spatial analyses of ant colonies was performed. Ant colony density and spatial distribution patterns will impact grassland restoration efforts.

**010.099 U Relationship between plant biodiversity and soil type at the Texas A&M University – Central Texas campus, Tara Nawrocki, Texas A&M University - Central Texas; Laura Weiser Erlandson, Texas A&M University - Central Texas**

A comprehensive ecological survey of the Cross Timbers and the Blackland Prairie ecoregions was carried out at representative sites across the Texas A&M University - Central Texas (TAMUCT) campus. This survey was initiated to study aspects of the campus terrain and rural mix of prairie and woodland characteristics. In 2009, TAMUCT acquired approximately 272-hectares of undeveloped land from Fort Hood. Though TAMUCT has limited the amount of construction and development to the northernmost edge of the property in recent years, plans for development are underway. Biodiversity recovery following habitat change is often difficult to determine, therefore, we collected data on ground flora, soil, and geological information from 15 sites across the TAMUCT campus. Using random sampling, the results

from the survey created a baseline study of the campus ecology and biodiversity. Data were recorded using the Shannon–Wiener diversity index, soil textural analysis, and geographic information systems (GIS) for hotspot identification. This study resulted in the identification of 13-plant families and four plant diversity hotspots. Soil analysis suggest that this campus lacks elevated amounts of fine silt and sand; however, increased aggregated soil and clay composition is likely essential to the role in water retention of the identified native plant communities throughout the TAMUCT campus. This study has provided a point of reference for future studies to be completed at the TAMUCT campus which could include, primary-growth succession, invasive species removal, metapopulation community structure, and habitat restoration and remediation.

**010.100 U Significance of eBird as a predictive migratory tool on wild hummingbird migration, Ashley Michaela Rea, Schreiner University**

Widespread increases of anthropogenic changes to the environment are forcing evolutionary strains on species that have the potential to influence distribution and behavior. The research collected explores migratory patterns of *Archilochus alexandri*, Black Chinned, and *Archilochus colubris*, Ruby Throated, hummingbirds in Kerr County, Texas. The species abundance and behavior from March 2017 through November 2017 was analyzed by utilizing data uploaded to eBird, a citizen science-based network, and executing physical observations at Schreiner University's Loftis Field Station. Additionally, the research collected will provide insight into the functionality of eBird as a predictive tool. The data analysis proved varying results on the reliability of eBird as a predictive tool for wild avian migration patterns, but emphasized the value and necessity of public science-based networks for future research opportunities. Upon completion, the data collected will be uploaded to eBird and available to the public.

**010.101 G Testing dark spot affinity of bee flies (Diptera: Bombyliidae) using a novel pan trapping method, Lauren G Garrett, Sul Ross State University; Chris M Ritzi, Sul Ross State University**

Bee flies (Diptera: Bombyliidae) are pollinators and parasitoids of various insect groups, including multiple families of soil nesting Hymenoptera. Dark spot affinity is a common observation for female bombyliids, presumably searching for target host nests in soil. To assess bombyliid dark spot attraction, a novel pan trapping method was performed at the Sul Ross State University Ranch and experimental vineyard. Blue and yellow fluorescent pan traps, half with black spots and half solid, were laid out in various sections of the vineyard and ranch area. Four pan trapping plots measuring 0.5x1x1m filled with garden soil at a depth of 15cm were constructed. Two additional pan trapping arrays were set and moved every week to survey the

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surrounding vegetation in the vineyard and ranch. Additional four pan-trapping assays were constructed, consisting of three sand pits each approximately 10cm in diameter and 15cm deep. Blue and yellow traps with entirely black bases and UV paint lines were set supplementary. Four subfamilies and 9 genera were recovered through all sampling combined, consisting of Anthracinae (*Anthrax*, *Epacmus*, *Hemipenthes* and *Villa*), Bombyliinae (*Heterostylum*, *Lordotus*, and *Sparnopolius*), Ecliminae (*Thevenetimyia*), and Phthiriinae (*Poecilognathus*). *Poecilognathus* were recovered in high abundance all sites, comprising over 85% of all specimens collected. The solid blue pan traps yielded the highest number of bee fly specimens, while the spotted blue and yellow traps yielded the greatest diversity. By comparison, the UV traps at the sand pit sites collected the least bombyliids.

010.102 U **The effects of dispersal and nitrogen fertilizer on leaf litter arthropod communities**, Kendall Nicole Terry-Stewart, Concordia University Texas; Jordan Davis, Concordia University Texas; Rebecca Navarro, Concordia University Texas; Courtney Jones, Concordia University Texas; Mary Kay Johnston, Concordia University Texas

Community composition in an area is affected by both available resources and the dispersal patterns of local pools of organisms. To examine the strength of each of these factors, we tested the effects of nitrogen addition and dispersal on leaf litter arthropod communities in central Texas. Our experiment used a 2x3 factorial design and took place in thirty 0.25m<sup>2</sup> sample plots. We used pulse and press additions of nitrogen fertilizer in our nutrient addition treatments, as well as a control treatment. For our dispersal treatment, we temporarily relocated 1L leaf litter from surrounding areas to our sample plots. We then removed that leaf litter the following day. At the conclusion of our experiment 3 weeks later, leaf litter was collected from sample plots, and Berlese funnels were used to extract leaf litter arthropods. After identification and enumeration, we used 2-way ANOVA to evaluate patterns in community composition among treatments. We found that species richness and Shannon diversity were marginally higher in dispersal treatment plots. This indicates that small increases in dispersal (such as temporary movement of leaves over one 24-hour period) can have persistent effects on local communities weeks later, and these implications may be especially great for small, dispersal limited organisms such as mites.

010.103 U **The link between larval cannibalism in *Chrysoperla rufilabris* and egg stalk length**, Kaitlyn Liane Clark, Texas A&M University - Central Texas; Laura Weiser Erlandson, Texas A&M University - Central Texas

Lacewings are a group of insects that are used as a form of biological control against garden pests, such as aphids. Larval lacewings feed on aphids using their

piercing mouthparts, and decrease the population levels of aphids in agriculture. Unfortunately, lacewings exhibit cannibalism as larvae. Presumably, lacewing adults evolved to lay their eggs on stalks to inhibit cannibalism. There is a considerable variation in the length of the egg stalk and this may affect the rate of cannibalism among larvae. To study the effect of variable stalk length on cannibalism in *Chrysoperla rufilabris* (Burmeister) (Neuroptera: Chrysopidae), the larval behaviors and rate of cannibalism of *C. rufilabris* larvae were examined on varying lengths (short, medium, and long) of egg stalks. We also examined the level of cannibalism among larvae of different age classes. Cannibalism occurred in the majority of the trials. The behavior of cannibalism in lacewings in relation to the egg stalk length provides essential information that may aid in biological control programs.

010.104 N **The sawflies of Texas with an account of world grass feeders**, Richard James Wilson Patrock, TAMUK

Grasses are a hugely important plant family because of their prominence in terrestrial vegetation patterns, their use as host plants by many disparate insect groups, as well as being a major foundation of the human food supply. I examined worldwide ecological patterns of host use of grasses by sawflies, considering the importance of regional distributions, C3/C4 plant metabolism and phylogenetic accounts of host radiations. Host and distributional data was drawn from a comprehensive search of >30,000 taxon names in the ECatSym database and more recent literature. I overlaid these results onto recent phylogenetic constructions of the group to examine host shift patterns. In addition, I compiled checklists of sawflies for the local Coastal Bend region and State of Texas using information derived from Texas museum and ECatSym literature sources.

010.105 U **Total cholesterol and triglyceride influence on Siphonaptera abundance in *Neotoma micropus* (the Southern Plains Woodrat)**, Clarence Sparks, Midland College; Diana Garcia Garcia, Midland College; Missy Schenkman, Sul Ross State University; Joseph Schenkman, Midland College; Chris M Ritzi, Sul Ross State University

The Southern Plains Woodrat (*Neotoma micropus*) is host to a wide range of parasites, both external and internal. It is well known that many of these parasites, particularly Siphonapterans, are vectors of zoonotic diseases. There is little to no data available addressing the possibility of physiological factors, specifically lipid levels within the *Neotoma micropus* host, affecting the parasitic abundance and prevalence. The goal of this study was to determine if there is a relationship between this specific mammalian host's lipid levels and the Siphonapteran load that it carries. A sample size of sixty-four *N. micropus* were captured using a live

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trapping technique at two distinct locations in Midland County, Texas. Captured woodrats were anesthetized in the field with the use of isoflurane, allowing for ectoparasite collection via the brushing method and blood collection via intracardiac puncture of the left ventricle. All Siphonaptera collected were identified to lowest level possible and quantified. Blood serum lipid levels (specifically total cholesterol and triglycerides) were evaluated with the use of an IDEXX VetLab analyzer. Data were analyzed to show any correlation between the blood serum lipid levels and the flea load on each host using various statistical methods.

**010.106 U Track-tube assessment of a small mammal population in an urban ecosystem**, *Austin Word, East Texas Baptist University; Benjamin Dyess, East Texas Baptist University; Troy A Ladine, East Texas Baptist University*

Thirty track-tubes were placed in a 6 X 5 pattern ca. 10 m apart on the Environmental Studies Area (EnStA) of East Texas Baptist University. Tubes were checked for tracks once a week from 22 Sept. through 17 Nov. 2017. The first 2 weeks tubes were not baited after which they were baited with dry oatmeal. The EnStA is part of a larger urban ecosystem located in Marshall, TX (32°33'N; 94°22'W) with private homes located on the west and east sides, a five-lane highway on the north and the athletic fields of ETBU located on the south. Track-tubes were located close to the athletic fields in an area where the edge plants had been cleared. Because of the clearing of the edge plants, we were investigating if this clearing had any potential effect on the presence of small mammals. Thirty-four tracks of three species were found in 20 of 30 tubes during the 9 weeks of the study. Estimated density of small mammals in the area was 0.008 / ha. Tracks of white-footed mouse (*Peromyscus leucopus*), rat (*Rattus* sp.; most likely the black rat *R. rattus*), and southern short-tail shrew (*Blarina carolinensis*) were identified. Previous mark-recapture studies have shown a small density of these species. Therefore, it is difficult to assess if the clearing of the edge plants had an affect on the presence of small mammals.

**011. Cell and Molecular Biology Oral Session & Section Meeting**

4:00 to 6:00 pm

Marie Hall Building, 202

Cell and Molecular Biology

Cell and Molecular Biology Oral Session & Section Meeting

Participants:

4:00 011.107 U **A bioinformatic approach to identify potential vaccine targets against the southern cattle tick**, *Rhipicephalus microplus*, *Caley Thomasson, St. Edwards University; Charles Hauser, St. Edward's University; Adalberto Perez De Leon, U.S. Department of Agriculture; Felix Guerrero, U.S. Department of Agriculture*

The southern cattle tick, *Rhipicephalus microplus*, is an economically important tick that can transmit several pathogenic microorganisms, including babesiosis and anaplasmosis, to its cattle and white tailed deer hosts during the feeding process. While a campaign led by the U.S. Department of Agriculture (USDA) resulted in the eradication of the tick in the United States, many factors have contributed to its re-emergence in Texas, thus leading to the need for a vaccine to protect livestock from these diseases. This study employed a bioinformatic analysis pipeline to identify potential vaccine targets from a variety of assembled *Rhipicephalus microplus* EST sequences. Potential tick peptides were predicted and compared to *Homo sapien*, *Drosophila melanogaster* and *Bos taurus* proteomes to identify proteins unique to ticks. These proteins serve as possible targets in the development of a vaccine to combat the re-emergence of *Rhipicephalus microplus* in the United States cattle industry.

4:15 011.108 U **Differential gene expression in *C. reinhardtii* after exposure to cerium nanoparticles**, *Analise Roth, St. Edward's University*

With the growing use of engineered nanoparticles (ENP), it is crucial to determine their impact on eukaryotic cells. CeO<sub>2</sub> nanoparticles are used commercially as a diesel fuel additive and are emitted in particulate phase. Cerium has been found to have adverse health effects, though there are no known effects of cerium nanoparticles. CeO<sub>2</sub> nanoparticles are water soluble and has evidence of absorption by certain crops. To examine the impact of cerium nanoparticles on eukaryotic cells, the unicellular algal model organism *Chlamydomonas reinhardtii* was exposed to CeO<sub>2</sub>/CeO<sub>2</sub> nanoparticles. To characterize transcriptomic responses RNAseq analysis was conducted. Transcriptomes were sequenced using Illumina technology, resulting reads mapped to reference genome using STAR, and differential expression analyzed with DESeq2. The literature on the engineered nanoparticulate cerium leads us to hypothesize pathways regulating cell cycle and protein metabolism will be differentially expressed in response to nanoparticle exposure.

4:30 011.109 U **Differential mechanism of action of 3,4',7-O-trimethylquercetin on three types of ovarian cancer cells**, *A H M Zuberi Ashraf, Student; Laura Weiser Erlandson, Texas A&M University - Central Texas; Nasir Uddin, TAMHSC*

Quercetin is a class of flavonoids which is a component of several different plants. It has been reported to have anti-inflammatory and antioxidant properties. 3,4',7-O-trimethylquercetin (34'7TMQ), a derivative of quercetin has shown to inhibit metastasis. Recently, it was demonstrated that 34'7TMQ inhibited the in vitro melanoma B16 cell metastatic activity. Our study evaluated the effect of 34'7TMQ on three ovarian cancer cells (SK-OV-3, CRL11731 and CRL1978), and

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we found that 34'7TMQ inhibited ovarian cancer cell migration and invasion without affecting proliferation. This phase of the study was directed to elucidate if the 34'7TMQ induced apoptotic signaling in the cancer cells. The expression of pro-apoptotic proteins such as BAX, Bcl-2, p38 MAPK, and Caspase-9 were measured by Western Blot analysis. The induction of apoptotic signaling was detected by immunofluorescence using Annexin V and DAPI stains. In CRL-1978 cells, BAX/Bcl-2 and Caspase-9 expression were upregulated whereas p38 MAPK expression was downregulated. In SK-OV-3 cell line, BAX/Bcl-2, Caspase-9, and p38 MAPK expression were upregulated. In CRL-11731, BAX/Bcl-2 expression was downregulated whereas Caspase-9 and p38 MAPK expression were upregulated. 34'7TMQ at 6.25 $\mu$ M induced apoptotic signaling in the CRL-1978 ovarian cancer cell line. Therefore, 34'7TMQ is seen to induce apoptosis in three types of cancer cell lines but it appears to have different mechanism of action for each cell line.

- 4:45 011.110 N **Effects of Hypoxia exposure on global DNA methylation in Brown Shrimp**, MD Saydur Rahman, University of Texas Rio Grande  
Knowledge of the effects of environmental exposure to hypoxia (dissolved oxygen, DO: <2 mg/L) on critical physiological functions is essential for accurate predictions of its chronic impacts on marine communities. Epigenetic modifications involve changes in DNA (mainly DNA methylation) or surrounding chromatin, resulting in changes to the function and regulation of the gene expression but not altering the DNA sequence. Epigenetic changes permit rapid phenotypic adjustments to environmental change; increased exposure to environmental stressors could cause long-term deleterious effects on future generations, further exacerbating adverse effects on population abundance beyond those due to impaired functions in exposed species. Epigenetic modifications also play a crucial role in interactions between environmental stress and exposed species. However, little is known about the epigenetic signals occurring in aquatic invertebrates during exposure to environmental stress. In this study, the changes in global DNA methylation and regulation of the related enzyme, DNA methyltransferase (DNMT), were investigated in hepatopancreas tissues of brown shrimp (*Farfantepenaeus aztecus*, an important shrimp species in the Gulf of Mexico) after chronic exposure to hypoxia (DO: 1.7 mg/L for 1-2 weeks). Hypoxia exposure caused marked increases in the expression of DNMT mRNA levels in hepatopancreas tissues. In addition, 5-methylcytosine (5-mC, a methylated form of DNA base cytosine) contents were markedly increased in hepatopancreas tissues after hypoxia exposure. Collectively these results suggest that hypoxia leads to increasing in global DNA methylation through the related enzyme, DNMT, which might be involved in

epigenetic modifications during exposure to environmental hypoxia in aquatic invertebrates.

- 5:00 011.111 G **The effect of induced aestivation on the immunocompetence system in *Scaphiopus couchii* found in southwest Texas**, Alexandria-Jade Martinez Roberts, Sul Ross State University; Sean Graham, Sul Ross State University  
Desert vertebrates exhibit remarkable physiological mechanisms for surviving in extreme environments. In addition, species with short breeding seasons often exhibit behavioral and physiological adaptations to increase breeding success within a narrow window. Couch's spadefoot (*Scaphiopus couchii*) is a burrowing frog found throughout the Desert Southwest. Spadefoots live in extreme environments, especially for amphibians, and exhibit a well-known explosive breeding system associated with brief periods of intense monsoon rainfall. Outside of the breeding season spadefoots aestivate underground for prolonged periods. The hormone pattern associated with the breeding system of this frog has been studied, however, the effect of long-term aestivation on immunocompetence in *S. couchii* has not been examined. We captured 53 spadefoots from west Texas and induced aestivation in the laboratory. We tested immunocompetence using a bacterial killing assay after 4 week, 6 week, and 8 week aestivation treatments. Preliminary results suggest that longer aestivation reduces immunocompetence, with bacteria only killing 7.7% of plasma within the 4 week treatment group, bacteria killing 43.9% of plasma within the 6 week treatment group, and bacteria killing 60.3% of plasma within the 8 week treatment group. This suggests that spadefoots incur a physiological cost for their capacity for prolonged aestivation and may be more susceptible to pathogens or parasites during dry periods.

**012. Chemistry & Biochemistry Oral Session 2**

4:00 to 6:00 pm

Marie Hall Building, Room 101

Chemistry and Biochemistry

Chemistry & Biochemistry Oral Session 2

Participants:

- 4:00 012.113 U **Cactus Mucilage nongelling extract as a descalant in water**, Abraham Fausto Jornada Cooper, Howard Payne University  
When contaminated water is treated with cactus mucilage, it has been seen to capture sediment, arsenic, and bacteria, making the water safer for individuals to drink. On this basis, the following experiments conducted look at what other applications cactus mucilage can be used for. Nongelling extract (NE) of the cactus was produced, which came from the supernatant when blended and centrifuged. Spectrophotometric analysis was first conducted of the iron content in water with and without NE treatment. Results showed a 10% decrease of iron. Next using complexometric titration, it was tested how NE affects



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- calcium content in water when treated. Using a controlled environment, results showed a 10% decrease in calcium levels (318ppm untreated; 285ppm when treated with NE). This concludes that the NE of cactus mucilage is able to remove calcium from water, thereby acting as a descalant. Use of cactus mucilage becomes more practical especially with the abundance of cactus in Texas. Future experiments will test how the NE can be optimized and if NE can be used to treat produced water, a major waste product that comes with extracting oil and gas.
- 4:15 012.114 U **Cation exchange capacity determination: Comparison of three different methods**, *Lillie Alexandra Zech, Stephen F Austin State University; Alyx S. Frantzen, Stephen F. Austin State University*  
The cation exchange capacity (CEC) of clay minerals is a fundamental property. During formation, clays undergo isomorphic substitution resulting in a net negative charge, corresponding to the number of cations required to balance the charge; this is the CEC. The CEC of four standard clays has been determined using three different methods: ammonia gas sensing ion selective electrode (ISE), ultra-violet visible light spectrophotometry (UV-vis), and atomic absorption spectrophotometry (AA). UV-vis and AA determination methods rely on measuring the absorbance of the cations remaining in solution after exchange with the clay. The ISE method of determination relies on the exchange of ammonium cations through the saturation of the exchangeable cation sites in the layers. Comparison of the three methods on hectorite clay from California, and montmorillonite clays from Texas, Wyoming, and Arizona was done to determine the accuracy of the three individual methods. The UV-vis method was performed on clays exchanged with Cu<sup>2+</sup>, Co<sup>2+</sup>, and Ni<sup>2+</sup>. The AA method was performed on clays exchanged with Cu<sup>2+</sup> and Ni<sup>2+</sup>.
- 4:30 012.115 G **CEC determination of alkyl ammonium exchanged smectite clays using combustion methods**, *Celeste Keith, 1994; Alyx S. Frantzen, Stephen F. Austin State University*  
Bomb calorimetry was employed as a method for determining the CEC of four standard smectite clays. The cation exchange capacity (CEC) of the clay is representative of the exchangeable sites on the clay and defines the clays applicability. The current method for CEC determination is accomplished using an ammonium electrode which has an acceptable error range of  $\pm 20\%$ . With this wide of an error range, improvements are highly desired. The clays were purified to remove unwanted materials, then saturated with sodium ions which were then replaced with larger alkyl ammonium ions. These alkyl ammonium ions provide the hydrocarbons necessary to achieve a combustion reaction using a semi micro bomb calorimeter. The gross heat recorded from this combustion is directly proportional to the number of
- alkyl ammonium ions present in the interlamellar region of the clay. The amount of alkyl ammonium ions the clay can hold represents the CEC of the clay. X-ray diffraction was used to better understand how the alkyl chains are situated in the interlamellar region on the clay. This information will be used to determine what salt and clay combination best suited for use of CEC determination.
- 4:45 012.116 U **Cactus Mucilage effects on produced water**, *Richard Treviso, Student*  
The prickly pear cactus is a common plant found in America, which has many attributes such as consumption, healing, and purification of water. It is an abundant resource that can grow in harsh environments with lack of water. To expand on the abilities of cactus mucilage, research will be conducted as to how the extract will affect different metals. First, the cactus extract will be used to detect whether or not it can reduce the amount of iron content present in water. The instrumentation used for the Iron analysis will be a UV Spectrometer. Second, the cactus extract will be used to detect whether or not it can reduce water hardness. More specifically, the amount of calcium content in water will be examined before and after cactus extract treatment. The water hardness will be determined by titration of EDTA, and the results will be presented in ppm (parts per million). The cactus mucilage is expected remove the fore mentioned metals, but the efficacy is currently unknown. If the cactus mucilage removes these metals and is efficient at doing so, this will attribute greatly to the topic of water purification.
- 5:00 012.117 U **Latent fingerprint development: Mechanistic study of DFO and serine using DFT**, *Alaina Spurr, Stephen F. Austin State University; Brian Barngrover, Stephen F. Austin State University*  
A latent fingerprint is the impression caused by the transfer of perspiration and oils from the finger ridges onto a porous surface. Latent prints are not detected until brought out through a chemical process. Recently, it has been discovered that 1,8-Diazafluoren-9-one (DFO) is a more sensitive latent print developer, meaning it produces more ridge detail in the latent prints, lasts longer, and develops as a fluorescent orange color when exposed to an alternate light source. There is currently one proposed reaction mechanism pathway by Wilkinson et al., [Forensic Sci. Intl., 2000, 109, 87] between DFO and the amino acid, L-alanine. This study will be using serine because it is the most abundant amino acid found in perspiration, therefore, there is a higher probability of a reaction occurring. To carry out the study, density functional theory (DFT) calculations are utilized by employing Amsterdam Density Functional (ADF) software package. Calculations were performed with Becke Perdew (BP86) functional and a triple zeta polarized (TZP) basis set. According to the possible mechanism, the reaction between DFO and the solvent facilitate an

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attack from the nitrogen of the amino acid. The resulting aromatic imine then undergoes decarboxylation. Hydrolysis occurs and an aromatic amine and acetaldehyde are formed. Reaction with another DFO molecule forms the completed reaction displaying the two DFO particles joined together by a nitrogen bridge. After attempting to model the proposed pathway, there were inconsistencies with the reaction energies. Therefore, we proposed our own mechanism.

- 5:15 012.118 G **Photothermal absorbance detector for liquid chromatography**, *Bikash Chouhan, University of Texas at Arlington; Purnendu K. Dasgupta, UT Arlington*

Optical absorbance measurement is one of the most commonly used analytical methods. Despite the name, the amount of absorbed light is rarely measured; how much is absorbed is measured indirectly by measuring the amount transmitted. With rare exceptions, as for a highly efficient fluorophore, absorption of light ultimately results in heating the solution. In the rare cases where photothermal detection are pursued they generally aim at measuring some property that changes as a result of increase in temperature: refractive index, solution conductivity, or the pressure in a confined system. We explore here a very simple photothermal detection scheme wherein the rise in temperature is directly measured. In principle, such a scheme has the advantage that temperature rise is independent of the cell path length. Light absorption increases with increase in optical path length, however, the mass of the solution to be heated increases proportionally. As the temperature change to be measured is very small, a differential measurement configuration was employed to minimize temperature fluctuations. The differential temperature was measured for two relatively close locations with a pair of fine (25  $\mu\text{m}$ ) thermocouple wires, one before and one after the point where the light beam passes through the analyte. With a high power white Light Emitting Diode (LED) from an inexpensive flash light and a simple inexpensive circuit, the limit of detection (LOD) achieved was 10 ng (21 pmol) for chromotrope 2R (2-(phenylazo)chromotropic acid disodium salt) when injected on a 2.1 mm diameter column with a detection volume of 5.4  $\mu\text{L}$ .

- 5:30 012.119 G **Synthesis and characterization of biodiesel fuels via transesterification of triglycerides with furfuryl alcohol**, *Amanda Lynn Raley, Stephen F. Austin State University*

Green chemistry is on the rise with growing popular support for decreased reliance on petroleum-based fuel production. Biodiesel is an alternative to petroleum-based diesel fuels, produced via transesterification of a triglyceride with an alcohol. Triglyceride sources can include coffee oil, canola oil, sunflower oil, and peanut oil among others. Alcohols commonly used for biodiesel synthesis are methanol and ethanol. However, another potential alcohol source for biodiesel synthesis

is furfuryl alcohol. Furfuryl alcohol is a byproduct of sugarcane refining and is inexpensive. Moreover, biodiesel fuels made using furfuryl alcohol could have interesting calorimetric properties. The synthesis of the first known biodiesel fuels produced using furfuryl alcohol is reported here. Various triglycerides were transesterified by heating furfuryl alcohol with  $\text{K}_2\text{CO}_3$  in the presence of an ionic liquid and using THF as a co-solvent. The reactions were performed using conventional heating as well as microwave heating. Product mixtures were characterized using  $^1\text{H-NMR}$  spectroscopy and bomb calorimetry. The transesterification reactions gave fatty acid furfuryl ester (FAFurE) mixtures with good percent conversions, as determined by integration of  $^1\text{H-NMR}$  spectra.

- 5:45 012.120 U **Theoretical mechanistic study of latent fingerprint development using 1,2-indanedione and serine**, *T. Russell Stager, Stephen F. Austin State University; Brian Barngrover, Stephen F. Austin State University*

The use of latent fingerprint reading has been done for almost half a century. Through theoretical analysis using computational software, the interactions and mechanisms of molecules in latent fingerprinting can be found. The mechanisms involved with the compounds used with reading these prints have not been studied thoroughly for the 1,2-indanedione solution. The solution is used to find latent prints from sources such as papers, cardboard, or other absorbent materials. The 1,2-indanedione is used to react with the amino acids left behind by finger prints. These amino acids are secreted by the glands in the finger tips and bottoms of feet. The mechanism of how 1,2-indanedione reacts with certain amino acids of the fingerprints left behind is still not well understood. For the specifics of this study the serine molecule was used as the amino acid to interact with the 1,2-indanedione molecule. With ADF, bond energies can be found mathematically by employing density functional theory (DFT). The bond energies that are found through simulating a reaction with 1,2-indanedione with certain amino acids can be used to determine the actual mechanism for the reaction. If the energies are favorable, then it can be concluded what the possible mechanism is. The bond energies of the accepted mechanism have been observed to be 152.5 eV which is highly unfavorable. There is ongoing research currently being conducted to reduce the energies involved.

**013. Geosciences Oral Session 2 & Section Meeting**

4:00 to 6:00 pm

Marie Hall Building, 105

Geosciences

Geosciences Oral Session 2 & Section Meeting

Participants:

- 4:00 013.121 G **The application of ZooMS to North American faunal material**, *Erin M Keenan Early,*

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*Jackson School of Geosciences, University of Texas at Austin*

One of the major obstacles in paleontology and zooarchaeology is the high fragmentation rate of recovered faunal material. Highly fragmented animal bones are frequently taxonomically unidentifiable due to the loss of morphological characteristics. A methodology known as zooarchaeology by mass spectrometry (ZooMS) addresses this issue by looking at the peptide mass fingerprint of the protein collagen (I) recovered from bone fragments. ZooMS requires the use of a reference database to make identifications using a fingerprint, but virtually no North American species exist in the database, making this valuable tool unavailable for use by North American researchers. This project has begun the process of remedying this problem, starting with eight common North American species. Application to the Gault archaeological site in Bell County, Texas, demonstrates both the immense need and potential for ZooMS in North America.

4:15 013.122 N **Integrated geophysical characterization of Karst related geohazards along Ranch to Market 652**, *Wesley Augustus Brown, Stephen F. Austin State University; Kevin W. Stafford, Stephen F. Austin State University*

Differential dissolution of Permian evaporite karst throughout the Gypsum Plain of West Texas has become a significant geotechnical problem. This is especially significant in Culberson County due to an increase in vehicular traffic related increased petroleum exploration, extraction, and transportation within the Delaware Basin. The Castile Formation which is the dominant formation within the study area, consists of gypsum/anhydrite and is highly susceptible to dissolution and karsting by meteoric, surface and groundwater flow. Karstic features along roadways in the Castile outcrop are common and include sinkholes, surface subsidences and caves of both epigenic and hypogenic origin. Traditional methods of conducting karst surveys have proven to be very effective in mapping the extent of subsurface features once they are located. However, these methods sometimes fail to delineate the full extent of subsurface features that are not manifested on the surface. A current integrated geophysical study being conducted by researchers at Stephen F. Austin State University in collaboration with the Texas Department of Transport (TxDOT) aims to characterize the extent of karst geohazards on 34 miles of roadway located along RM 652 and managed by the El Paso District of TxDOT. This presentation highlights preliminary results from ongoing capacitively coupled resistivity studies, AC resistivity studies, and ground penetrating radar studies being conducted along and nearby RM 652 located in Culberson County, Texas. The results of this study will produce a comprehensive risk assessment of the area that will be utilized by the TxDOT to avoid geohazards within the region.

4:30 013.123 N **Status of excavation of the middle Eocene WU-26 micro-mammal fauna from the Uinta Formation in the Uinta Basin**, *James Westgate, Lamar University*

The WU-26 ("The Pond" local fauna) micro-mammal locality was first discovered in the mid-1990's by a Washington University team conducting surface surveys for fossil mammal remains. It yielded a few mammal specimens over subsequent years. In 2007, a 900 kg test sample was removed by a joint team from the College of Charleston, Midwestern University and Lamar University in hopes of recovering micro-mammal remains using screen-washing with 0.5 mm mesh screens. This screen-washing technique was successful as about 30 micro-mammal teeth were recovered from the concentrate using binocular microscopes in the Lamar University Paleontology Lab. In subsequent summers the target sample was raised to 4500 kg per trip. During the 2016 field season our total sample reached approximately 150,000 kg and yielded more than 800 micro-mammal teeth identifiable to at least the genus level. WU-26 is stratigraphically located in the Uinta C member of the middle Eocene Uinta Formation. It lies 40 m below the base of the Brennan Basin Member of the Duchesne River Formation. The WU-26 fauna provides a glimpse into the diverse mammal community which inhabited the Uinta Basin about 41 million years ago. WU-26 is the first micro-mammal fauna discovered in the Uinta C Member of the Uinta Formation. The fauna indicates that several micro-mammal species thought to have gone extinct during Uinta B and early Uinta C Member time, actually continued to inhabit the Uinta Basin throughout most of the deposition of the Uinta C Member.

4:45 013.124 U **Geochemical and petrographic characterization of Chert workability**, *Joshua Cyrus Wynn, Wayland Baptist University; Tim Walsh, Wayland Baptist University*

Ten chert types varying in provenance were fashioned into a basic triangular point and their ease of workability was examined. Petrographic, inductively coupled plasma mass spectrometer laser ablation (ICP-MS-LA), and X-ray diffraction (XRD) analyses were performed on chert. During point manufacturing the properties of each flake removed from chert were recorded. Some of the flaking properties observed were platform angle, flake length, and flake mass. After comparing the flaking properties of chert with the data obtained from the various petrographic and geochemical analyses it appears that chert types characterized by an ordered quartz matrix and that are geochemically pure had the most desirable flaking properties. As examples, Arkansas Novaculite was geochemically pure, had an ordered matrix, homogenous texture, and produced longer flake terminations in the early stages of point manufacturing. Contrarily the impure Tecovas chert, which had a

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disordered quartz matrix with many chalcedonic regions, created many surficial fractures when processed. However, having an ordered matrix seems to play the more important role in chert workability. The Alibates chert had variable geochemistry and several quartz grain sizes, yet still produced clean terminations throughout point manufacturing. It was the most workable chert type among the three listed here which appears to be the result of the different quartz grain sizes regularly distributed throughout the chert's matrix. This suggest that homogenous texture and pure geochemistry are not as influential on chert workability as an ordered matrix. The mechanisms behind these observations are currently being investigated.

**014. Physics and Engineering Oral Session & Section Meeting**

4:00 to 6:00 pm

Marie Hall Building, 107

Physics and Engineering

Physics and Engineering Oral Session & Section Meeting  
Participants:

4:00 014.126 U **Comparing the number of Radio Loud Quasars with high velocity H $\beta$  line widths to total number of Quasars**, *Miranda Brooke Gilbert, Sul Ross State university*

Quasars were first discovered by Schmidt in 1963 after he observed a very bright and powerful radio source at a redshift of  $z=0.16$ . Later, quasars were grouped into two sections: radio loud (RL) and radio quiet (RQ). In 1965, Sandage observed that only about 10% of the known quasars were radio loud. The difference between RL and RQ quasars is measured by the detected emission happening in the radio wavelength spectra. Using Data Release 7 (DR7) from the Sloan Digital Sky Survey (SDSS) we revisited the observation that 10% of detected quasars are RL. From the collection of 105,783 quasar data we were able to supply support for this hypothesis. H $\beta$  emissions from RL quasars resulted in 11.458%. Additionally, MgII emissions from the same collection of RL quasars resulted in 10.545% and CIV 8.463%.

4:15 014.127 U **Development of instrumentation and metrology for low magnetic field bio-imaging**, *Susana Beltran, Southwestern University; Joshua Biller, National Institute of Standards and Technology, Magnetic Imaging Group; Karl Stupic, National Institute of Standards and Technology, Magnetic Imaging Group*

Solution state DNP can be applied to enhance NMR and MRI signals at low fields (<0.3T); however, the process is not understood well enough to make quantitative measurements. Recently a digital NMR was constructed at NIST and has been extended to include DNP operation programmed with LabVIEW. Along with the DNP experiment, the instrument can measure T1H with a simple single pulse saturation recovery experiment (SPSR). However, the SPSR

suffers from a larger measurement error (10%) than the more commonly used inversion recovery sequence. To reduce error in the T1H measurement, work was undertaken to program in an inversion recovery sequence with composite pulses and an eight-step phase cycle. Another source of error in the DNP experiment is sample heating caused by use of very high incident powers (40W) to saturate the paramagnetic transition. More efficient resonator designs were also explored with higher efficiencies to reduce use of high incident powers.

4:30 014.128 U **Effects of nickel, multi-walled carbon nanotubes, and multi-walled carbon nanotubes/nickel nanoparticles on power production and wastewater treatment of microbial fuel cells**, *Diana Beltran, Southwestern University; Jia Liu, Southern Illinois University Carbondale*

Having an abundant amount of waste water makes it necessary to find a more effective way of treating water. Microbial fuel cells (MFCs) are a clean way of treating water that in the process produces clean electricity. The problem with this is that MFCs produce very low voltage and have not been developed to a greater scale. The purpose of this experiment is to coat the cathode electrode with different nanoparticles and hopefully reduce the internal resistance of the MFC, resulting in more power and cleaner wastewater. Methods and detections used in this study include electrochemical impedance spectroscopy, polarization curves, chemical oxygen demand tests, nanoparticle production by precipitation method and SEM/EDS for characterization. The result obtained was that the internal resistance was maximally reduced by 0.74 k $\Omega$  and the power density maximally increased by 1085.524 mW/m<sup>3</sup>.

4:45 014.129 N **Physical and thermal properties of modern stabilized Adobe**, *Gerald Mulvey, University of the Incarnate Word; Sreedevi J. Ande, University of the Incarnate Word*

Adobe brick has been used for millennium as a building material for single and multistory structures across six continents. The main disadvantage of adobe brick is its susceptibility to rain degradation and water infiltration damage. The use of modified adobe as a sustainable building material is expanding. The energy conserving onsite brick manufacturing and the physical properties recommend this technique for serious consideration as the building material of the future. This paper explores the physical attributes of adobe brick, being used as a building material in San Antonio, Texas for the construction of commercial apartment complexes. The density, thermal coefficient of expansion and water absorption tests, and morphology analysis using Scanning Electron Microscopy on adobe brick will be conducted in this present study to evaluate its use in modern construction.

5:00 014.130 N **Visualizing hydrogen molecular**

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**wavefunctions using Monte Carlo methods**, *Steve Alexander, Southwestern University; R.L. Coldwell, University of Florida*

Using a grid of up to 65 machines and variational Monte Carlo methods we have calculated the electron density, the intracule density, the extracule density, the electron density difference, the Laplacian of the electron density, the Laplacian of the intracule density and the Laplacian of the extracule density of several states of the hydrogen molecule near their equilibrium distance. We discuss how contour plots of these properties can be used to visualize the distributions of electrons in each molecule.

5:15 014.131 U **Visualizing non-linear dynamical systems in virtual reality (VR)**, *Bryan Hollingsworth, Southwestern University*

To understand non-linear dynamical systems, we commonly use mapped out values to predict the behavior of the system. In the case of Virtual Reality, we can visualize beyond two-dimensional mappings which allows us to view complete three-dimensional systems or take three-dimensional Poincaré sections of higher dimension systems. We used a game engine, Unreal Engine 4, to model these systems and to help offload many calculations to our Graphics Processing Unit (GPU) without changes to the code. We now have a program that can model basic examples of non-linear dynamical systems and we continue to work toward modeling more complicated systems through this program. Once we can model any system, this program will be a useful tool in learning non-linear dynamics and we may find behaviors of various systems that we did not see before.

**015. Science Education Oral Session 1**

4:00 to 6:00 pm

Marie Hall Building, 201

Science Education

Science Education Oral Session 1

Participants:

4:00 015.133 N **A case-based approach to teaching evolutionary biology**, *Raelynn Deaton Haynes, St. Edward's University*

Evolutionary concepts can be difficult to master as they are theoretical, conceptual, and quantitative. This requires higher-levels critical thinking and fairly sophisticated analytical skills of students. Evolution is a broad-scale synthesis of all biological topics, which necessitates an understanding of fundamental biological concepts and an ability to apply and connect complex theoretical material. This expectation often comes with low grades and lack of motivation by students, both of which can lead to a general frustration with the course by students and professors alike. After years of struggling with these challenges, I sought to develop a new and more effective method by which evolution can be taught that would 1) increase student engagement; 2) use best-teaching practices; and 3) incorporate more

active learning and group work; and 4) enhance student mastery of difficult concepts in evolutionary biology. Through the use of student-developed and student-led case studies, I have been able to increase student satisfaction in the course, increase my own enjoyment teaching the course, engage students in class through case studies and active learning, decrease DFW's, and enhance student mastery of difficult theoretical evolutionary concepts such as trade-offs, gene by environmental interactions, population genetics, and epigenetics, to name a few. In this presentation, I will discuss how the students develop and teach using their case studies, different methods by which they can be implemented in the classroom, show a short demonstration of how they can be used, and talk about how professors and students can collaborate to produce publishable-quality case studies.

4:15 015.134 G **An exploration of an informal robotics / art program in a children's STEAM museum**, *Sarah Harris, University of Texas at Austin*

Children across the country visit science centers and museums every day, therefore, it is reasonable to study these settings to see if and how learning occurs. These informal situations allow children to learn about STEAM (science, technology, engineering, arts, and mathematics) outside of a traditional classroom. Because many children participate in such activities, museums are interested in the outcomes of their programming, particularly special programs offered in addition (sometimes for an additional fee) to the permanent exhibits and interactives. This type of research is important because parents are turning to STEAM centers to supplement their children's learning outside of the traditional classroom space. Classroom researchers should be aware of and consider the potential impact of these informal programs on their studies. The purpose of this paper is to explore how parents and children interact to learn about robotics within the child's zone of proximal development (ZPD). This study is narrowly focused on a single program implemented three times to a total of five families, and it seeks to explore how parents play a role in their child's developing knowledge of robotics. This paper will address the following research questions: 1. How do parents and children co-construct knowledge about robotics in a children's STEAM museum program? 2. How do parents promote or hinder learning within the children's zone of proximal development (ZPD) while participating in an educational program for families?

4:30 015.135 U **Assessing elementary pre-service teachers' science content knowledge and teaching efficacy**, *Mamta Singh, Lamar University*

It is important for elementary pre-service teachers to have strong science content knowledge as this helps them to become confident and teacher with knowledge who can easily address science misconceptions in

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classroom. If pre-service teachers lack a firm knowledge and understanding of any science topic he or she is teaching, it may lead to development of misconceptions which is one of the major issues in elementary science teaching and learning. Therefore, the purpose of this study was to investigate elementary pre-service teachers' science content knowledge and teaching readiness. Participants were students enrolled in science methods course for pre-service teachers. Content knowledge pre-posttests based on four science domains: Life Science, Physical Science, Earth, Space Science, and Science and Technology Applications along with pre-post STEM teaching efficacy survey were used to measure the research objectives. The results indicated that the participants increase their knowledge at the end of the semester and also their teaching efficacy was improved in the post survey.

4:45 015.136 G **Exploring Latino parent attitudes toward and involvement in Science**, *Izzy De Leon, Texas State University; Julie F. Westerlund, Texas State University*  
Diversity within teams and organizations guards against groupthink and overconfidence and improves the ability to problem solve and make predictions. These benefits transfer into the Science, Technology, Engineering, and Mathematics (STEM) career fields as well. Even though there are various efforts in K-12 public schools to increase diversity within the STEM fields, minorities are still largely underrepresented in the workforce. This study focuses on the Hispanic/Latino population to help close this gap in representation within the STEM fields. Most programs focus on directly influencing Hispanic/Latino students to pursue STEM careers, while there are many indirect factors that can influence these students as well. One of these factors is parent perceptions of science and involvement in science. The most common reasons parents are not as involved in their children's science learning is a negative view of science and a lack of knowledge of resources to support their children. To find out more about parent attitudes toward science and parent involvement in their children's science learning, we organized a series of Family Science Events in San Marcos, Texas. The activities and experiments performed during the Family Science Events used materials that are found around the home or can be purchased cheaply. Results suggest that parents who attend our Family Science Nights are already interested in science, but still don't know where to find resources to support their children's science learning.

5:00 015.137 N **Outcomes from a teaching module for how science works aimed at college students**, *Rebecca M Price, University of Washington Bothell; Kathryn Elizabeth Perez, University of Texas Rio Grande Valley*  
Improving students' understanding of how science works requires instruction that goes beyond the standard "scientific method" recipe. We developed a

teaching module built around the How Science Works Flowchart from Understanding Science. We combined two previously published activities (the Cube Puzzle and the case study Asteroids and Dinosaurs) that teach how science works to college science majors and use the flowchart to reflect on these activities. The data we used to test the model effectiveness was pre and post-module student drawings of the process of science. We found that student's diagrams were significantly less linear and more complex in the post-module drawing. Students also improved in how much they included social activities of science such as presenting results at a meeting or discussion with colleagues. However, even after the module, students failed to mention the benefits of science to society. We present an intervention that is easy to implement and improves important components of scientific literacy in college students.

5:15 015.138 N **Sustaining student facilitated learning via a workbook: ending the cycle of grant dependency**, *James E. Becvar, University of Texas at El Paso; Geoffrey Saupe, University of Texas at El Paso; Juan Noveron, University of Texas at El Paso; Mahesh Narayan, University of Texas at El Paso*  
The University of Texas at El Paso (UTEP) has developed and enhanced the talent pool of undergraduate students in science and engineering from the Paso del Norte region of the United States by implementing and honing the learning intervention of Peer Led Team Learning (PLTL) in General Chemistry I and II. Our 17-year program is now significantly funded via a self-sustaining, self-funding strategy involving the creation and sale of Workbooks, student-authored learning materials published through a collaborating non-profit publisher. As in other PLTL Programs, students enroll in lecture and must co-register in required, small-section PLTL Workshops. The learning in each Workshop is facilitated by an undergraduate Peer Leader, a student who has done well in the course and has been trained for the purpose. Funds to pay the leaders initially came from National Science Foundation (NSF) grants. When external funding neared an end, this very successful PLTL intervention was continued by involving the Peer Leaders themselves in authoring learning materials. The undergraduate-Leader-authored materials represent intellectual property. This IP is donated to a non-profit, which organizes the materials into learning modules in Workbooks, and the Workbooks are sold to the local bookstore. What would normally be called 'royalties' are donated by the non-profit publisher to a university Gift Fund, with the Gift Fund providing a cost center used for paying for training costs and for the hourly wages of the Leaders. Workbooks organize the content of the PLTL Workshops, provide content sequence for faculty lecturers, and significantly fund the program.

5:30 015.139 N **Maximizing STEM learning in microbiology laboratory through bacterial**

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**enumeration**, *Joni H Ylostalo, University of Mary Hardin-Baylor*

An important concept that biology students often struggle with is serial dilution. This concept combines mathematics and logic, and when taught in a microbiology laboratory, generates an attainable STEM-based learning environment. I have developed a two-laboratory session lesson in bacterial enumeration techniques that challenges the students through a real-life problem. Furthermore, the lesson helps the students discover the link between direct and indirect methods of determining bacterial concentrations. During the first laboratory session, students learn the basis of various microbial enumeration techniques through inquiry-based teaching that challenges students' higher order thinking skills. Each group is then given a bacterial broth culture with an unknown concentration of bacteria. Students will set up the serial dilution experiment and plate the bacteria from each of the dilutions on agar plates. Students will also generate a different serial dilution series and measure the turbidity. During the second laboratory session, students identify a plate set with a countable number of colonies on it. Students use these colony counts to determine the bacterial concentration of their unknown. Furthermore, students form a link between the direct and indirect enumeration techniques by generating a standard curve of absorbance versus bacterial concentration. Finally, students are asked to determine a concentration of a bacterial unknown without the use of serial dilution and plate count, but rather using their standard curve ensuring that the link between the direct and indirect methods was mastered. This lesson has contributed to the increase of student section scores in the senior biology laboratory exam.

**016. Terrestrial Ecology & Management Oral Session 1**

4:00 to 6:00 pm

Marie Hall Building, 203

Terrestrial Ecology and Management

Terrestrial Ecology & Management Oral Session 1

Participants:

4:00 016.140 U **Assessing the dendroclimatological potential of juniper tree-rings in Palo Duro and Caprock Canyons, TX**, *Chelsea Beaubouef, Wayland Baptist University; Matthew S Allen, Wayland Baptist University*

Variability in tree-ring growth has been used extensively as an indicator of historic climatic conditions, but to date, few dendrochronological studies have been conducted in the Texas Panhandle region. In this study, we obtained cores from one-seed (*Juniperus monosperma*) and Rocky Mountain Juniper trees (*J. scopulorum*) in Palo Duro and Caprock Canyon in the panhandle of Texas. The objective of our study was to locate old trees and assess their sensitivity to climate conditions. To date, we have collected 21 tree-ring cores and cross sections from Palo Duro Canyon and 9

from Caprock Canyon (1-3 cores were collected per tree). The cores were collected from trees on the canyon floor and along south facing slopes. Samples were then sanded to make the cells easily visible. Ring counts on the collected samples range from 27 to 511. Ring widths are variable through time, but so far it has been difficult to correlate growth patterns across tree-ring series. The samples appear to have false and/or missing rings that have made crossdating challenging. In Caprock Canyon, all of the trees exhibited episodic cambial damage from early spring freeze events (frost rings). Recent drought events (e.g., 2011 drought) are also recorded as narrow rings. Ongoing work and more samples will hopefully resolve the crossdating challenges experienced so far and allow us to determine how tree growth might be affected by climate.

4:15 016.141 G **Blood hormone and lipid level correlation to the quantity of ectoparasites present on the Southern Plains Woodrat (*Neotoma micropus*)**, *Missy Schenkman, Sul Ross State University; Joseph Schenkman, Midland College; Clarence Sparks, Midland College; Diana Garcia Garcia, Midland College; Chris M Ritzi, Sul Ross State University*  
*Neotoma micropus*, the Southern Plains Woodrat, is host to a wide range of parasites, both external and internal. It is well documented that these parasites are potential vectors of zoonotic diseases; however little is known regarding the possibility of the host's internal physiology influencing parasitic abundance and prevalence. This study focused on determining if there was a connection between the *N. micropus* sex hormone and lipid levels to the external parasite load (such as ticks, mites, lice, and fleas). A sample size of sixty-four *N. micropus* were captured with live traps at two locations in Midland County, Texas. In the field, woodrats were anesthetized with isoflurane which allowed for ectoparasite collection via the brushing method and blood collection via cardiocentesis of the left ventricle. Collected ectoparasites were grouped by type, quantified and taxonomically identified to lowest level possible. Blood serum hormone levels were obtained through ELISA testing and the lipid levels (specifically total cholesterol and triglycerides) were evaluated with the use of an IDEXX VetLab analyzer. Data analysis included each host's ectoparasite density, intensity and prevalence, and various statistical methods were used to evaluate the presence of a link between the blood serum hormone and lipid levels to ectoparasite abundances.

4:30 016.142 U **Comparison of two non-toxic particle films for control of Juvenile Lone Star Ticks (*Amblyomma americanum*)**, *Eduardo Munoz, Schreiner University; Allan Showler, USDA Agricultural Research Service; Weste Osbrink, USDA Agricultural Research Service; Ryan Matthew Caesar, Schreiner University*  
Global climate change and movement of livestock have

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caused increasing concerns about the re-colonization of arthropod disease vectors from areas where they had been previously eradicated. There are also myriad reasons to seek non-toxic control methods that minimize impact on non-target species. As such, the purpose of this study was to test the lethality of two non-toxic particle films in a laboratory setting using a tick model (*Amblyomma americanum*, lone star tick). The particle films in question were Cimexa, an engineered silica powder, and Kaolin, a powdered clay mineral. Treatments included a variety of applications at different concentrations to determine LD-50; these included immersion, contact with a treated surface, and sprayed aqueous suspensions. Ticks in the egg, larval, and nymph stages were used in these assays. It was determined that Cimexa was considerably more lethal than Kaolin and that treatment through immersion proved to be the most effective method. Furthermore, it was discovered that both powders didn't perform well in egg toxicity assays regardless of the tested concentrations used.

- 4:45 016.143 G **Does consumption of different prey influence epidermal lipids in snake sSkin?: A quantitative and qualitative analysis.** *John Michael Weidler, Sam Houston State University*  
As the primary barrier to cutaneous water loss in tetrapods, epidermal lipids play a vital role in water conservation and homeostasis. Previous studies have shown the negative correlation between the aridity of a species' habitat and the quantity of lipids in the epidermis. In general, the more arid the environment, the greater amount of epidermal lipids, thus lowered skin permeability to water. However, there are no current studies investigating the potential influences of diet on epidermal lipids and cutaneous water loss. I conducted a study on a captive colony of snakes (*Agkistrodon piscivorus*), controlling for either a fish (*Notemigonus crysoleucas*) or mouse (*Mus musculus*) diet. I found no difference in cutaneous water loss or lipid content between snakes in either diet group indicating that lipid content and cutaneous water loss are strong species-specific physiological performance traits not influenced by recent dietary history. While there is some evidence that epidermal permeability may be variable under certain environmental conditions (e.g., humidity), my findings show that diet has no effect and that a shift in prey preference may not influence or enhance physiological performance for decreasing cutaneous water loss.

- 5:00 016.144 U **Effects of burrowing prairie crayfish on soil nutrients and microbial communities.**, *Tara Nawrocki, Texas A&M University - Central Texas; Harold P. Collins, USDA-ARS; Philip Fay, USDA-ARS; Wayne Polley, USDA-ARS*  
North American crayfish (Family: Cambaridae) are considered keystone species in both terrestrial and aquatic invertebrate assemblages. Crayfish influence

the flow of energy and nutrient cycling as well as supporting many higher animals in prairie ecosystems as prey food. Crayfish also perform important roles as predators, processors of detritus, and scavengers of carrion and vegetation. In Texas, of the six genera and 43 known species only four are considered primary burrowers. Terrestrial burrowing crayfish build "cone" shaped mounds that can reach 20-cm in height with burrows up to 2-m deep depending on the size of the crayfish and depth to the water table. This study described the distribution of terrestrial burrowing crayfish in a Blackland prairie environment by determining; 1) the relative abundance and density of terrestrial burrowing crayfish and 2) the chemical and biological properties of burrow excavations compared to the surrounding bulk soil. Water soluble C, total N and NH<sub>4</sub>-N and NO<sub>3</sub>-N and soil respiration were significantly higher in bulk soil compared to crayfish mounds. Soil incubations exhibited a significant decrease in N released from the crayfish mound than bulk soils suggesting reduced resources or lower or less active microbial communities in mounds. Microbial community analysis using phospholipid fatty acids (PLFAs), showed a significant reduction of biomarkers from 44 in bulk soil to 22 in mounds. These changes in PLFAs revealed significantly different communities between the bulk soil and crayfish mounds. Bacterial:Fungal biomass ratios declined by 40% while biomarker PLFAs for Actinomycetes and Protozoans declined 67% and 80%, respectively.

- 5:15 016.145 N **Beetles, Weevils, and Scales, Oh My! Monitoring of three biocontrols for salt cedar in the Trans-Pecos Texas and Southeast New Mexico.** *Chris M Ritzi, Sul Ross State University; Alexandra M Hassenflu, Sul Ross State University*  
Saltcedar (*Tamarix spp.*) is a deciduous shrub or small tree that was introduced into the United States from Eurasia in the early 1800s to stabilize riverbank erosion, serve as a windbreak, and as an ornamental. However, due to a high reproductive potential, saltcedar has become invasive on many river systems in the western United States. Some of the most dense tamarisk infestations have occurred in the southern areas of the Rio Grande, and in an attempt to control this plant by biological means, the consortium consisting of the USDA, NRCS, and Sul Ross State University released several species of tamarisk leaf beetle (*Diorhabda spp.*) in southern Brewster and Presidio counties in Texas. The suitability of the species was evaluated, and data suggested that the Tunisian Subtropical species (*D. sublineata*) was best suited to this region. Observations have also shown that the tamarisk leaf beetles are capable of establishing on a close relative non-target species, the athel tree (*T. aphylla*). Six sites along the Rio Grande River, from Lajitas, TX to Candelaria, TX, have been routinely monitored to determine the long-term impact of leaf beetle defoliation on saltcedar and the non-target athel trees in the region. While



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defoliation by *D. sublineata* has been sporadic this past year, activity by other biocontrols, namely the splendid tamarisk weevil (*Coniatus splendidulus*) and the tamarisk scale (*Chionaspis spp.*), has been increasing. Efforts were made to broaden the search for all three biocontrols, documenting activity across the Trans Pecos Texas and southeastern New Mexico.

5:30 016.146 U **Habitat associations and population estimates for the Texas Horned Lizard (*Phrynosoma cornutum*) in the Texas Panhandle**, Sara van der Leek, Wayland Baptist University; Andrew Kasner, Wayland Baptist University

This study was conducted July-October 2017 using transects and area searches to locate Texas horned lizards in Hale and Floyd counties, Texas. Once located, lizards were captured, if possible, and morphological and habitat measurements were taken. Passive integrated transponder tags (PIT tags) were inserted subcutaneously in lizards with a snout-vent length >40mm. A total of 33 lizards were documented on three separate research properties. Of those, 14 were PIT tagged, 16 were <40mm, 2 were encounter only (not captured), and 1 lizard was being predated by a western hognose snake (*Heterodon nasicus*) and thus excluded from any data analysis. There were no recaptures of marked lizards this year, thus the high-end population estimate is 32 lizards, including hatchlings (SVL <40mm). The low-end population estimate is 26, and excludes hatchlings that could not be identified as individuals. Herbaceous cover was measured using the Daubenmire cover class method (%grass, %forb, %litter, %bare ground in a 20x50cm quadrat), and vegetation height was measured using a meter stick (modified Robel method). There was no significant difference ( $p>0.05$ ) in habitat variables between male and female locations. Hatchling locations contained a higher percentage of grass ( $U=63.000, p<0.05$ ) and bare ground ( $U=50.500, p<0.01$ ) cover when compared to juveniles/adults. Random locations had a higher percent grass cover ( $U=239.500, p<0.001$ ), lower percent bare cover ( $U=945.000, p<0.001$ ), and had taller vegetation cover ( $U=140.000, p<0.001$ ) than lizards locations. Research is planned to continue during the Summer of 2018.

**Saturday, March 3**

**018. Anthropology Oral Session & Section Meeting**

8:00 to 10:00 am

Marie Hall Building, 107

Anthropology

Anthropology Oral Session & Section Meeting

Participants:

8:00 018.148 G **Preliminary analysis of 87Sr/86Sr ratios from organisms on Lanzarote, Canary Islands: Creating a bioavailable baseline for understanding ancient human mobility**, Paloma Cuella del Pozo, Texas A&M University College Station

In this study I measure bioavailable strontium (Sr) on the island of Lanzarote, Canary Islands, to create a preliminary baseline of the islands geochemical levels that organism's bioaverage in their tissues. Moreover, this research seeks to identify differences in strontium levels from Lanzarote versus levels known in Northwest Africa. The peopling of the Canary Islands is currently debated, with North Africa typically identified as the area of origin for ancestors of ancient Canary aboriginals. To address this question interdisciplinary approaches, such as stable isotope analyses (SIA), can be used to elucidate mobility patterns of ancient populations into, and throughout the archipelago. As every region of the world has specific radiogenic isotopic signatures, strontium SIA ( $^{87}\text{Sr}/^{86}\text{Sr}$ ) has proven to be a useful method in understanding ancient human and animal population's movements. Mammals absorb calcium (Ca) generally from food and water, as well as Sr, which is "mistakenly" incorporated into mineralized tissues due to the similar atomic masses. As such, archaeological samples reflect the  $^{87}\text{Sr}/^{86}\text{Sr}$  ratios where ingested food and water was procured. Moreover, since in ancient societies consumption of food and water was generally from local sources, an analysis of the  $^{87}\text{Sr}/^{86}\text{Sr}$  ratios for an individual can be used to identify if a person was from the area or not during the time of tissue growth. However, for SIA of Sr to be useful, it is first necessary to identify if the regions being compared are geochemically heterogeneous through preliminary baseline data, such as those presented here.

**019. Biomedical Sciences Oral Session & Section Meeting**

8:00 to 10:00 am

Marie Hall Building, 105

Biomedical Sciences

Biomedical Sciences Oral Session & Section Meeting

Participants:

8:00 019.150 U **Assessment of endocrine disrupting compounds among children through the analysis of Bisphenol A in milk.**, Angela Marisol Encerrado, student; Wen-Yee Lee, Associate Professor  
Bisphenol A (BPA) is an Endocrine Disrupting Chemical (EDC) commonly used in the plastics and food packaging industries. Because of its applications in common household products, BPA is spread in our environment. A number of studies have reported BPA's capability to leak into different food sources, such as milk. As BPA can mimic hormones functions and causes developmental issues in children. With milk being considered the major food source for infants, it is important to monitor BPA and other EDCs in milk, to ensure infant welfare. There are many existing methods BPA detection in milk; however these methods are tedious and require the use of organic solvents. The aim of this project is the development of a simple, solventless, and sensitive method for the analysis of BPA in milk. The use of a solventless sample

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preparation technique called stir-bar sorptive extraction (SBSE) coupled with Thermal Desorption/Gas Chromatography/Mass Spectrometry, has proven to be a cost effective method for organic contaminants in liquid samples. Due to the high affinity of BPA to lipids, its extraction from milk is hindered (~30%). This project investigated parameters such as pH, sonication, and temperature during treatment preparation to increase BPA's recovery from milk. Results indicated that the release of BPA from milk, increases with acidic and basic pH, and that the sonication time plays an important role in the amount being released. For the future, the optimized method will be applied to breast milk and other dairy products.

8:15 019.151 G **Associations of obesity and lifestyle factors between children in rural and urban areas in West Texas**, *Kassandra Hernandez, Sul Ross State University; Chris M Ritzi, Sul Ross State University*  
Two related problems that many children are facing today are child obesity and poor eating habits, which has resulted in an increasing number of children becoming unfit. Obesity in children has increased nearly three times in the past 50 years, and about 1 and 3 children in the U. S. are classified as being overweight or obese. The question is raised, is there any correlation between BMI and percent body fat to geographic settings? Thus the objective of this study is to attempt to determine if there is any evidence or information on whether a child's geographical settings associated with culture, lifestyle, and demographics affect their body composition determined by BMI and body fat percentage in the Trans-Pecos, Texas area. This study uses body mass index, percent body fat, and a nutrition survey for measurements gathered from numerous children residing from different parts of West Texas. The cities selected for this study were determined by choosing a selection of rural and urban cities in West Texas region by using the United States Census Bureau. There have been few studies of the associations of child overweight or obesity and related health issues with urban and rural environment, thus this study could be of importance to school districts if the findings recognize that geographical settings can play a major factor with student health. The data gathered from this study can also be used to institute healthy lifestyles in many schools and homes, thus increasing quality of life in the region.

8:30 019.152 U **Dermatophyte susceptibility to Gentian Violet**, *Debbie Steinert Brannon, University of Texas of the Permian Basin*  
This study tested the susceptibility of dermatophytes to gentian violet (GeV). Dermatophytes are fungi that thrive on the keratin substrate causing cutaneous infections such as onychomycosis, a fungal infection of the fingernails or toenails. Because fungi are eukaryotic as are human cells, caution must be used to not harm the patient during treatment. Susceptibility

tests were run on two organisms, *T. rubrum* and *T. mentagrophytes*. The two organisms were grown on Sabouraud Dextrose Agar (SDA) plates with 20 µg/L Gentamicin and 30 µg/L Cycloheximide. Antibiotic disks containing 1% GeV, 2% GeV, and 0% GeV (control) were each placed on separate SDA plates containing each of the organisms. The test was replicated three times. Each trial was continued for twenty (20) days and the zone of inhibition (ZOI) was measured every three (3) days. During each trial, regrowth of the organisms was observed on the plates, decreasing the ZOI. Regrowth, however, was not seen until the twelfth day of the trial indicating GeV was effective until that point. The results suggest that GeV could be an effective alternative treatment for onychomycosis. Furthermore, GeV is less costly than other available treatments and is easily obtainable over-the-counter. Testing has been expanded to include clinical samples of nail clippings of patients diagnosed with onychomycosis. The clippings were cultured on SDA plates and other growth was observed in addition to fungus. Periodic acid-Schiff staining is being conducted to study the different types of growth. This research affords an opportunity to apply clinical-based research to actual patients.

8:45 019.153 U **Effects of imidacloprid on physiological and neurological functions of the non-target organisms *Caenorhabditis elegans* and *Hyalallela azteca***, *mayra levario, St. Edward's University*  
Imidacloprid, a neonicotinoid insecticide widely used in commercial agriculture, is a systemic neurotoxin believed to harm non-target organisms in the environment. Imidacloprid was discovered in ground water in 1998, with concentrations ranging from <1ppb to 1ppb. *Caenorhabditis elegans*, a microscopic soil-dwelling nematode decomposer, is an excellent model system for characterizing the unintended consequences of imidacloprid in soil as it reliably exhibits simple behaviors, and its neurons express the nicotinic acetylcholine receptor (nAChR) when it encounters imidacloprid. Additionally, the amphipod *Hyalallela azteca* resides in freshwater environments where Imidacloprid can be found due to runoff. *Hyalallela azteca* behaves predictably and expresses nAChR, making it another ideal model organism to investigate the unintended effects of Imidacloprid. Wild-type *C. elegans* were exposed to Imidacloprid via their food source. Mechanosensory and fecundity functions were assessed. We tested a concentration of Imidacloprid representing spillage or repeated usage (high, HI: 5.2 X 10<sup>-7</sup> mol/L) versus food source alone for control (C). In mechanosensory results, the youngest age (day 4) showed statistical significance. The results for fecundity showed a decreasing trend as generations were observed. *Hyalallela azteca*'s preferred environment was used to assess its cognitive disruption due to Imidacloprid exposure. Total of 140 amphipods were tested in groups of ten (equal number of both sexes).

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Fourteen tubs were filled with alternating HI vs C concentrations of Imidacloprid in water. Results indicated a disruption in cognition due to Imidacloprid exposure. More research on the harmful effects of Imidacloprid is needed as Imidacloprid is the most widely used insecticide globally.

9:00 019.154 N **Persistent organic pollutants (POPs) residues in human milk**, *Mohamed Hamza EL-Saeid, Prof. Chem @ Environmental Pollution, King Saud Univ.*

The aim of this study was to determine the types and levels of organochlorine pesticides (OCPs) present in the human milk collected from cities in eastern and central Saudi Arabia. This study is part of assessment of various persistent organic pollutants (POPs) in human milk in four cities of eastern and central Saudi Arabia. Milk samples were collected from 48 donors according to the WHO/UNEP protocol for monitoring human milk for POPs. The OCPs in each of the 48 milk samples were analyzed GC-MS/MS-TQD. Quality assurance included the analysis of blank, spiked and reference samples. Sixteen different OCPs were identified namely: aldrin, dieldrin, endrin, hexachlorobenzene, alpha, beta, gamma and delta hexachlorocyclohexane, pp'-op'-DDT, pp'-DDE, pp'-DDD, alpha and gamma chlordane, heptachlor, mirex and methoxychlor. The results of the analysis OCPs in human milk samples indicated that different levels of tested positive for one or more pesticide at the limits of determination used in this study. As required by the Stockholm Convention on POPs, the levels of certain POPs in human milk will serve as an indicator of the effectiveness of the treaty in eliminating or reducing emissions of selected POPs. This study contributes to that effort by providing new data on current levels of OCPs in human milk in Saudi Arabia.

**020. Chemistry & Biochemistry Oral Session 3 & Section Meeting**

8:00 to 10:00 am

Marie Hall Building, Room 101

Chemistry and Biochemistry

Chemistry & Biochemistry Oral Session 3 & Section Meeting

Participants:

8:00 020.156 N **Classic physical chemistry experiments: They ain't broke but we're fixin' 'em anyway**, *Alyx S. Frantzen, Stephen F. Austin State University*  
A standard experiment that is done in Physical Chemistry laboratory is Heat-Capacity Ratios for Gases. In this experiment, students determine the ratio of the heat capacity of a gas at constant pressure to that at constant volume. This can be done using the method of adiabatic expansion or the sound velocity method. The adiabatic expansion method is slightly easier to set up and requires less equipment, so many smaller colleges and universities tend to utilize this procedure. The classical set up for this experiment leaves many

opportunities for 'misfires,' resulting in the students having to start from the beginning, again. Often, students are unable to complete the three required trials and they leave the lab with incomplete data and a whole lot of frustration. While the experiment works well as is, we wanted to redesign the set up to be a little more 'fool proof' and give the students the opportunity to leave lab with a complete data set. The 'new' design and results of different configurations will be presented and discussed.

8:15 020.157 G **Evolved-gas analysis of the pre-ignition stage of a fire of invasive plants of East Texas with STA-IR**, *Antonio David Trevino, Stephen F. Austin State University; Alyx S. Frantzen, Stephen F. Austin State University*

Invasive plant species such as Chinese tallow, Chinese privet, and yaupon have changed the composition of East Texas forests. The increased biomass and decreased biodiversity due to these invasive species has resulted in altered wildfire behavior. The basis of wildfire behavior stems from many environmental conditions including topography, humidity, wind, and wildfire fuel. The invasives have altered chemical constituents and proportions of wildfire fuel. These changes have consequences that may have had a significant impact on the 2011 Texas wildfires. These wildfires that raged throughout Texas accounted for 47% of the total area burned throughout the entire United States. To determine what chemical substituents may account for the differences in flammability of different wildfire fuels, a study on the volatile organic compounds (VOCs) evolved during the pre-ignition stage of heating is required. This study will focus on the low temperature pre-ignition stage in which evolved-gas analysis with STA-IR will be employed to identify VOCs as they are evolved from invasive species. Typically, STA-IR is used with pure natural products to evaluate their thermal decomposition and degradation products. Gaseous IR analysis of plant materials tends to be very convoluted and difficult to identify specific compounds during thermal decomposition. However, by selectively focusing on the low temperature pre-ignition phase of a wildfire, a technique such as STA-IR may be useful in identifying the evolution of VOCs that can lead to increased flammability in wildfire fuels.

8:30 020.158 G **Identification of products of redox reacted dialkyl polysulfides**, *Indika Kasun Warnakula, Mr.; Marton Kiss, Dr.; Christian Thomas Rios, Mr.; Marissa Vergara, Miss.; Ramesha D. Gaspe Ralalage, Mrs.; Ashley Christine Whiteman, Miss.; Ilona Petrikovics, Prof.*

Organosulfur compounds that are found in many plants, such as garlic and the Allium genus are dialkyl polysulfides (IWR2SN). These were identified as lipophilic molecules which are produced by the decomposition of alliin in garlic. Most of these are soluble in fats, oils and non-polar solvents, but less

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soluble in water. Previous researchers have found IWR2SN to be good redox systems that are capable of being oxidized by oxidizing agents, also can oxidize Fe<sup>2+</sup> to Fe<sup>3+</sup> in the blood. In literature, IWR2SN are reported to be readily reacted with hydrogen peroxide, peracetic acid and metachloroperbenzoic acid (mCPBA). In order to get a detailed picture about the process, we reacted the IWR2SN with different oxidizing agents and analyzed the products. The IWR2SN was allowed to react at a controlled temperature between -5-0 °C with mCPBA, a strong oxidizing agent. The polar and non-polar components of the product mixture were separated by thin layer chromatography (TLC) using hexane:ethylacetate (7:3) as the mobile phase. The TLC spots were observed under long-wave UV light, and were extracted and analyzed along with acetone using HPLC-UV and GC-MS with pre-developed instrumental methods. According to the HPLC-UV results, the product solution contained polar and non-polar compounds compared to the IWR2SN, which were due to disproportionation and oxidation. Identification of the peaks was aided by GC-MS. From the IWR2SN molecule, elemental sulfur was formed and the oxidized product, sulfonate was also identified. In conclusion, dialkyl polysulfides undergo oxidation-reduction reactions with mCPBA yielding elemental sulfur, sulfonate, and other polysulfides.

8:45 020.159 U **Optimizing the RSIT value technique for invasive plant species**, Sydney Thompson, Stephen F. Austin State University; Alyx S. Frantzen, Stephen F. Austin State University

A standard method for determining the relative spontaneous ignition temperature (RSIT) value does not yet exist. A Perkin Elmer Simultaneous Thermal Analyzer (STA) is being used to aid in determining the RSIT values of the following invasive species: Chinese privet (*Ligustrum sinense*), Chinese tallow (*Triadica sebifera*), and yaupon (*Ilex vomitoria*). This work is being done to refine a new method by observing the effect of varied heating rates of the instrument and particle sizes of the samples on the RSIT value. However, no comparison can be made to the literature values since a standard method does not yet exist. Combustion analysis was also performed by way of oxygen bomb calorimetry on particle sizes from 10-150+ mesh to determine which gave the most consistent value of combustion energy. The dormant and growing seasons of these samples were analyzed under both oxidative and anoxic conditions.

9:00 020.160 U **Prolonging the time of fluorescence for Cy3-alkyne and Cy5-alkyne using ROXS**, Mauro A. Garcia, Southwestern University; Ian Orantes-Orellana, Southwestern University; Lauren Gillespie, Southwestern University; Dr. David Cooper, Southwestern University  
Fluorescent dyes, such as Cy3-Alkyne and Cy5-Alkyne,

are commonly used in a variety of biological techniques, such as fluorescent tagging and single molecule spectroscopy. The fluorescence signal, of these dyes, decay over time when the fluorophore is repeatedly excited, causing the dye to undergo a permanent loss of fluorescence. Photoprotection systems, such as the reducing and oxidizing system (ROXS), can be used to prevent the fluorophore from photobleaching. ROXS uses the methyl viologen and ascorbic acid redox pair to provide a faster pathway for the electron to travel from the excited triplet state back to the ground state, limiting the exposure time of the highly reactive triplet state of fluorophores. In conjunction with a bulk fluorescence screening process, varying ratios of ROXS to Cy3-Alkyne and Cy5-Alkyne were tested to determine the optimum concentration ratio of photoprotection system to fluorophores in order to maximize the fluorescence time. These results allow for the determination of optimal fluorescence performance, and provide a method for which other photoprotection systems can be rapidly screened and vetted.

9:15 020.161 U **Protein corona formation: Investigating the effects of cell culture growth media on nanoparticle size, stability, and net charge**, Yelixa Idalyss Avila, Sul Ross State University; Denise Perry Simmons, University of North Texas; Mohammad A. Omary, University of North Texas

Studies involving design, engineering, synthesis and characterization of nanoparticles (NP) provide approaches to probe therapeutic applications, such as targeting specific cancer cells. However, evidence suggests size of NP at the cell site is unknown due to Protein Corona when biomolecules engage NP during transit to target cell site. We ask whether these biomolecules result in Protein Corona- induced changes in designed-NP size, stability, and net charge consequently affecting the designed NP-targeted-cell killing. An in vitro cell line-driven biofluid assay (BFA) mimics and informs in vivo NP-biomolecule interactions. In-house, free radical polymerization using SDS-size driven synthesis of poly (methyl methacrylate) nanoparticles (PMMA-NP) was combined with a BFA of four NP dispersion media: PMMA-solvent, RPMI-1640, Fetal Bovine Serum, Growth Media (RPMI-1640 +10% FBS) of Jurkat E6.1 T-cell leukemia. Optimal PMMA-NP concentration was determined by serial 10-fold dilutions of PMMA stock plus defined-Zetasizer thresholds. PMMA-NP characterization in BFA dispersion media was studied at 37C/5%CO<sub>2</sub> over 27-hours, then captured as Dynamic Light Scattering size distribution, the zeta potential determinant of PMMA-NP colloid stability and surface charge. Results revealed a 28-30nm PMMA-NP of (-) 21.5 mV, which over the dispersion media time-course, increased size magnitude 10-100-fold with fluctuating net charges and zeta potential 1-2 fold magnitude changes. Evidence-based dispersion

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media physical-chemical properties provide theoretical explanations of the observed changes. We conclude biomolecules affect dynamic changes in PMMA-NP size, colloidal stability and net charge, over time. Ongoing experiments include investigating kinetic effects on biomolecule-PMMA-NP interaction, subsequent PMMA-NP targeted Jurkat T-cell killing, and PMMA-NP redesign concepts.

- 9:30 020.162 N **Students productively using phones: Improving the chemistry classroom through augmented reality**, *Brian Barngrover, Stephen F. Austin State University*  
We use technology every day from checking email, to surfing the web, and hopefully getting some work done. As an educator we are told that the integration of technology in the classroom will make it easier to relate to the student and that the technology will increase the student's understanding of the material. Why is this not implemented more and/or how can it effectively be done? In this presentation, the audience will be introduced to augmented reality "AR" and QR codes. Augmented reality is an overlay of computer generated graphics on the real world.

**021. Marine Science Oral Session & Section Meeting**

8:00 to 10:00 am

Marie Hall Building, 202

Marine Science

Marine Science Oral Session & Section Meeting

Participants:

- 8:00 021.164 G **Effects of high temperature on ovarian functions and heat shock protein expression in Atlantic Sea Urchin**, *Jackson Brooks Johnstone, University of Texas Rio Grande Valley, Department of Marine Sciences; Sarah Nash, University of Texas Rio Grande Valley, Department of Marine Sciences; Mario Molino, University of Texas Rio Grande Valley, Department of Marine Sciences; MD Saydur Rahman, University of Texas Rio Grande*  
Increasing surface sea temperatures are having an increasing impact on marine environments. Sea urchins are ideal model organisms to focus on, as they are excellent indicator species in regards to their response to global climate changes. They are also an ancient and relatively simple species, meaning that there are fewer internal mechanisms to deal with when observing responses. In this study, we tested on reproductive functions and heat shock protein expression, and coelomic fluid (CF, a body fluid which regulates important physiological processes) pH in Atlantic sea urchin at three different temperatures. Ten sea urchins were placed in each of six aquariums (capacity: 20-gallon) with high temperatures (28 and 32oC) and control variable (24oC) under controlled laboratory conditions for a 7-day period. For this experiment, the reproductive functions and heat shock protein expression only focused on female specimens, as the data for eggs was obtained quicker than that for sperm,

which is still pending. Sea urchin exposed to high temperature had the lower gonadal growth (gonad weight/body weight\*100) compared to controls. The percentage of mature eggs (ova) was also significantly lower at high temperature compared to controls, indicating impaired ovarian functions at high temperatures. Sea urchin exposed to high temperature showed an increase in heat shock protein expression in eggs and follicles, and decreased CF pH compared to controls. These results suggest that elevated water temperature reduces/acidifies pH of CF which might be involved in the impairment of reproductive functions in Atlantic sea urchin.

- 8:15 021.165 U **Habitat Preference of the Gulf Toadfish** *Opsanus beta*, *Claire Adams, St. Edward's University*  
Studies have shown that much is known about the metabolic plasticity of the Gulf toadfish, *Opsanus beta*, but little is known regarding their natural history. It is likely that toadfish are top predators in seagrass ecosystems. Since little is known about this aspect of toadfish, I aim to investigate and to better understand the habitat preferences of Gulf toadfish in Red Fish Bay, Texas. In a series of three experiments, I tested habitat preference of small, medium, and large toadfish. In the first field experiment, we tested habitat preferences in the field of the larger toadfish in plastic mesocosms (kiddy pools). These mesocosms consisted of a sand/mud mix bottom, 1/3 sand, 1/3 *Halodule*, and 1/3 *Thalassia*. Initial positions were recorded, and after one hour their position was recorded again. The bigger individuals were tagged with a plastic visual elastomer before being released. Smaller toadfish were brought back to the lab. In the lab, tubs were set up and randomly assigned 1/3 *Halodule*, 1/3 *Thalassia*, and sand. Both one hour and twenty-four hour observations occurred. Similar to the procedure in the field, initial, after one hour, and final position were recorded. The results showed that the toadfish do have a habitat preference for *Halodule* vegetation. There was no significant difference between their positions at 1 and 24 hours. Knowing more about where and how this particular species interacts within the ecosystem they live in can be beneficial to understanding the habitat requirements of a potentially important keystone predator in grass bed ecosystems.
- 8:30 021.166 U **Prevalence and intensity of Aspergillosis on *Gorgonia ventalina* and *G. flabellum* on the Mesoamerican Barrier Reef, Roatán, Honduras**, *Austin Ryan Biddy, Texas Tech University - Waco*  
*Gorgonia ventalina*, the purple sea fan, and *G. flabellum*, the venus sea fan, are two gorgonian species and common benthic organisms on Caribbean reefs. Aspergillosis is a common disease affecting *G. ventalina* and *G. flabellum*, which is caused by the fungus *Aspergillus sydowii*. This study was conducted in Roatán, Honduras to assess: 1) the prevalence of aspergillosis on *Gorgonia* spp., 2) the

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intensity of disease present on the sea fans, and 3) the presence and abundance of *Cyphoma gibbosum*, the flamingo tongue mollusc, on sea fans. A generalized linear regression with a post hoc ANOVA demonstrated that location was the strongest factor in determining the prevalence and intensity of disease. *Gorgonia flabellum* was more abundant than *G. ventalina* across all five dive sites. Healthy fans were more frequently observed than diseased fans. Depth and species of sea fans were not correlated with prevalence or intensity of aspergillosis. Although *C. gibbosum* was expected to be located on diseased sea fans, the species was not observed. The presence of large predatory fish in the protected and regulated Roatán Marine Park may limit the abundance of *C. gibbosum*. Future research should inquire into other vectors of *A. sydowii* and the transmission of infection to sea fans.

**022. Mathematics & Computer Science Oral Session & Section Meeting**

8:00 to 10:00 am

Marie Hall Building, 209

Mathematics and Computer Science

Mathematics & Computer Science Oral Session & Section Meeting

Participants:

8:00 022.168 U **Determining solvability of entanglements by connector loop orientations**, *Kyle Rickman, Wayland Baptist University*

We propose simpler criteria to determine the solvability of entanglements such as the "impossible figure eight puzzle" defined in Paul Melvin's "A Topological Menagerie." We identify connector loops on these types of entanglements and puzzles, which are defined as solvable when they satisfy the conditions in removing a trivial knot,  $m$ , from the entanglement. Melvin reaches solvability by determining if an arc, between the loops, is isotopically equivalent to the trivial arc, which can be difficult to determine. Our criteria of connector loop intersections allows us to determine by inspection if the entanglement is isotopically equivalent to the impossible figure eight, or a solvable case.

8:15 022.169 U **When two is better than one: Entrainment of the Fruit Fly Circadian Clock by light and temperature**, *Jacob Lee Woytek, Schreiner University; Kevin M. Hannay, Schreiner University*

The *Drosophila Melanogaster* (fruit fly) shows 24 hour activity rhythms driven by a molecular circadian clock housed in a handful of circadian neurons in the fly brain. Activity rhythms in fruit flies show a crepuscular pattern with a morning peak in activity followed by a "siesta" in the middle of the day and a final evening activity peak. Amazingly, these rhythms are highly regular and are able to follow the seasonal day-length closely. For the endogenous circadian rhythm to remain entrained to the external environment it must receive inputs from external sources. Two of the primary

environmental rhythms (zeitgebers) used to maintain a healthy circadian rhythm are the daily light and temperature cycles. In our work we study the dynamics of coupled oscillator systems entrained by two external forces. By performing a phase reduction of a coupled oscillator network, inspired by the fruit fly circadian neural network, we are able to analytically study the entrainment of collective oscillations driven by two environmental signals. We identify two dynamical regimes characterized by strong and weak coupling relative to the entraining forces and classify the bifurcations in these two parameter regimes. Finally, we interpret our results in the context of fruit fly circadian rhythms and discuss the implications of our results on seasonality in circadian oscillations.

**023. Science Education Oral Session 2 & Section Meeting**

8:00 to 10:00 am

Marie Hall Building, 201

Science Education

Science Education Oral Session 2 & Section Meeting

Participants:

8:00 023.171 N **Making small open tubular liquid and ion chromatographs for Terra Firma and beyond**, *Purnendu K. Dasgupta, UT Arlington*

Liquid Chromatography represents the single largest segment of the analytical instrument market today. The typical implementation is with one or more pumps pumping liquids at pressures often exceeding 10,000 psi through columns packed with tiny particles that are 1-5  $\mu\text{m}$  in diameter. The feasibility of open tubular liquid chromatography (OTLC), where liquids are pumped at modest pressures (even gravity flow) through an open tube whose walls are functionalized to interact with injected solutes was demonstrated as early as 1970. OTLC in 10-25 micrometer diameter columns is very easily and inexpensively realizable today: the hard part is a sufficiently sensitive small scale detector. This hurdle is now also almost gone. I will like to convince the audience that open tubular liquid chromatography provides an ideal format to take to the field and can indeed be a competitor to chromatographs on your benchtop. It is efficient only in very small capillaries, smaller than those used in capillary electrophoresis. But in recent years we and others have learned how to inject 10-15 L (fL) to multi- 10<sup>-9</sup> L (nL) volumes of samples in such capillaries, generate active chromatographic surfaces within capillaries as small as 5  $\mu\text{m}$  in bore and most importantly learned to make inexpensive detectors to detect analytes sensitively in such small tubes. The prospects of working meaningfully with practical inexpensive equipment (less than \$1000 for a high performance chromatograph!) are alluring: examples will be presented on ion chromatography and amino acid analysis.

8:15 023.172 G **The black and white of dye color and fluorescence: A simple teaching demonstration.**, *Laura I Saucedo, University of Texas at El Paso; Keith*

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*Pannell, University of Texas at El Paso*

We have developed a straightforward demonstration showing the difference between fluorescence and intrinsic dye color simply by variation of the background. A black material is known to absorb all visible light, while a white background does just the opposite, reflect. Therefore, when a solution of a known fluorescent dye derivative, e.g. 4,4-difluoro-4-bora-3a,4a-diaza-s-indacene (BODIPY), Figure 1, is placed on top of these two types of background, an interesting phenomenon occurs. With a black background no light is reflected back through the dye, thus any color seen by the naked eye will that due to the fluorescence of the material. A white background will permit reflectance of the incident light, and upon reflection from that surface the observer will see the transmitted light, i.e. the actual dye color. As a simple teaching demonstration, along with minimum of theory, it permits a discussion and understanding of the nature of color. This demonstration can be transformed into a permanent display and be a useful addendum to schools of every level, parent associations, etc. and to the community as a whole since it requires no equipment.

- 8:30 023.173 G **Transforming science education to increase interdisciplinarity and relevancy**, *Stephanie Ann Garcia, The University of Texas at San Antonio*  
This presentation will review an idea for a pilot study in which we will prepare teachers to create lessons that intentionally and critically connect to science, technology, engineering, art, and mathematics (STEAM) based problems within a Makerspace classroom. The study will look at the change and development over time through the use of teacher professional development. This study is important because from my experience as a classroom teacher and now a teacher educator, I have witnessed how STEAM has been more additive. Much of science education, even STEAM education, is additive, but not integrated as interdisciplinarity should be (Klein, 1990). Moran (2010) argues that our current education system is configured into separate disciplines that make knowledge restrictive, whereas “interdisciplinarity provides a democratic, dynamic and co-operative alternative to the old-fashioned, inward-looking and cliquish nature of disciplines” (p. 3). There are multiple benefits of making science education more integrated through a holistic, interdisciplinary approach that is connected to real world problems in our communities. With science as a foundation to other STEAM areas, it is important to analyze the ways in which we integrate all the fields together into the classroom. Makerspace is a perfect place to take this approach because it is a safe space that focuses on building things in a constructivist, STEAM environment. This collaborative, creative, and imaginative space provides opportunities for all students to learn and utilize 21st century learning skills that are necessary to be included in the teaching and learning experience.

- 8:45 023.174 N **The position of nature of science (NOS) in teacher preparation programs in Texas**, *Patricia Ramirez, The University of Texas Rio Grande Valley; Jair Aguilar, The /university of Texas Rio Grande Valley; Noushin Nouri, The university of Texas Rio Grande Valley*

The acceptance of the Nature of Science (NOS) in schools' curriculum has prompted the rise of preparing science teachers that are able to communicate an accurate picture of the Nature of Science in their classrooms. Among different possibilities for teaching Nature of Science, the literature supports using History of Science (HOS) as a vehicle to communicate NOS. Hence, it is important to investigate how HOS instructors, in teacher preparation programs, see learning NOS as one of their course's objectives to communicate NOS ideas. For this research, data were collected from 10 instructors who taught a HOS class for the UTeach program in 6 sites in Texas. A qualitative methodology of Multiple Case Studies was used for the data analysis. The results show unambiguously that most instructors who are not science-education specialists do not consider NOS a central course objective. Most do not include NOS explicitly in their HOS classes, although some refer to it implicitly. Some are completely ignorant of NOS, while a few are actively hostile toward the concept. Thus, teacher preparation programs should either include NOS in their program's mandatory course objectives, connect the course to NOS standards, or have an extra workshop in NOS.

- 9:00 023.175 N **The impact of a 15 hours workshop on Hispanic preservice teachers' attitudes and beliefs toward teaching science**, *Jair Aguilar, The /university of Texas Rio Grande Valley; Noushin Nouri, The university of Texas Rio Grande Valley; Patricia Ramirez, The University of Texas Rio Grande Valley*  
The importance of the Nature of Science (NOS) has been emphasized by many documents and research over the last century. It has been shown that learning NOS has an effect on better understanding the content of science, increasing motivation toward learning science, decision making, and critical thinking. Although few research have been conducted about the positive impact of the NOS on attitude toward teaching science among elementary teachers, no research has been done when the audiences are Hispanic teachers. With this proposed research we are interested in finding the impact of 15 hours of workshop about different elements of NOS on Hispanic preservice teachers' attitudes, and beliefs toward teaching science. Participants are 16 preservice teachers that have previously taken an elementary science methods course. Pre and post interviews will be conducted with the preservice teachers using questions related to NOS and attitude toward teaching of science. The collection of data will include all the artifacts, essays, and assignments the preservice teachers generate. In

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addition, all the interactions and discussions will be video recorded to capture all the details of their work. A Multiple Case Study approach will be used, in which each preservice teacher will be considered a case. In addition, we will analyze the changes in the teachers' knowledge about NOS and their attitude towards teaching science. Considering the fact that Hispanic students pursuing a degree in a STEM-related field are underrepresented, results of this research might be considered to improve science teacher preparation programs in both, motivation and knowledge.

**024. Terrestrial Ecology & Management Oral Session 2 & Section Meeting**

8:00 to 10:00 am

Marie Hall Building, 203

Terrestrial Ecology and Management

Terrestrial Ecology & Management Oral Session 2 & Section Meeting

Participants:

8:00 024.177 U **How citizen science augments our understanding of Texas amphibian natural history**, *Julianne Dewar, The University of Texas at Austin; Travis J LaDuc, University of Texas at Austin*  
The collection of natural history data by non-professionals ("citizen science") is becoming increasingly commonplace and encouraged. With citizen science databases rapidly filling with spatial and temporal occurrence data, questions arise as to how these data can be used and effectively integrated into our existing knowledge of species distributions. To address these questions, we examined the data on four species of Texas amphibians collected from two different sources: iNaturalist.org, a platform for collecting citizen science-generated images and sounds, and VertNet.org, an online database for natural history museum voucher specimen data. We used data collected on the Gulf Coast Toad (*Bufo nebulifer*), a species commonly found in suburban areas, to assess the ability of citizen scientists to document a species with high detectability. Data collected on the Sheep Frog (*Hypopachus variolosus*) were used to understand the role citizen science plays in the documentation and management of a protected species. To understand the effectiveness of citizen science in documenting distributions changing over time, we examined data for the Cliff Chirping Frog (*Eleutherodactylus marnockii*), a native species with a range restricted primarily to the Edwards Plateau, to records of Rio Grande Chirping Frog (*E. cystignathoides*), a species with a historically restricted, but currently expanding range. To reduce the bias in comparing records between the databases, records lacking coordinates were georeferenced using established protocols (i.e., MANIS) before being mapped using GIS-based software. Results will be complete by March 2018, however, preliminary results support the use of citizen science data to augment voucher-based collection data.

8:15 024.178 G **Insect pollinator diversity and other associates of Salt Cedar (*Tamarix* sp) along the Rio Grande in Presidio County, Texas**, *Alexandra M Hassenflu, Sul Ross State University; Chris M Ritzi, Sul Ross State University*

*Tamarix* sp. was introduced to North America in the 1800's and has become an ecological dilemma due to its rapid spread. Many studies have looked at the negative effects of salt cedar from an ecological standpoint, but not specifically at its effects on pollinators. As part of this study, a combination of pan trapping and observational techniques, supplemented with sweep netting and hand capturing techniques, was used to assess the pollinators associated with salt cedar and native flora. A total of twelve trees, six salt cedar and six native, were monitored along the Rio Grande in Presidio County. Each tree had three differently colored pan traps placed at its base for 24 hours, and was observed for pollinator activity for 15 minutes at the time of pan trap placement. Sampling began in April and was conducted biweekly during the ends of the project and weekly during the summer months concluding in November 2016. Approximately 6,816 insects, belong to seventeen orders were collected, with Hymenoptera being the most dominate group. All specimens were returned to the Jim V. Richerson Invertebrate Collection for sorting, pinning, and identification. Statistical analysis, including Shannon-Weiner Indices, were run to determine statistical significance of pan trap color and host environment on insect collection.

8:30 024.179 U **Post-Burn analysis of insect diversity at the Chihuahuan Desert Research Institute, Jeff Davis County, Texas**, *Katherine Marie Lee Mancha, Sul Ross State University; Chris M Ritzi, Sul Ross State University*

Pollinators are found everywhere and aid in sustaining life. Unfortunately, the number of pollinators are going through a serious decline. It is estimated that 16.5% of avian and mammalian pollinators are at a risk of extinction. Additionally, greater than 40% of pollinating insects are threatened. In 2011, the Chihuahuan Desert, and ultimately the pollinating community, got struck by a detrimental natural disaster. A fire, known as the Rock House Fire, burned 127,475 hectares (315,000 acres) of the Northern Chihuahuan Desert, including a sizable amount of the Chihuahuan Desert Research Institute (CDRI). In particular, the high grasslands were burned, while the nearby botanical gardens and canyon ecosystems were preserved. From 2006 to 2008, a study collected data from pre-burned areas of the grasslands and botanical gardens at CDRI. There was also a brief post-burn study conducted in these same plots to document any changes in pollinator abundance and biodiversity immediately following the fire. The current study is a follow up for the early post-burn work. To determine the recovery of insect species after the fire, specimens were collected via a 25 m by



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25 m grid of various colored pan traps and sampled weekly for insect activity. Specimens were taken back to the lab, sorted, pinned, and identified. After 12 trips, statistics were run comparing the data against prior pre- and post-burn data, as well as to compare pan trapping methodology. Results indicate a recovering insect community, and that different pan trap colors show differential attraction per insect groups.

- 8:45 024.180 G **Preliminary analysis of habitat use of sympatric rattlesnakes in West Texas**, Jaimie Michelle Lawhorn, Sul Ross State University; Sean Graham, Sul Ross State University  
Western diamondback rattlesnakes (*Crotalus atrox*), Mojave rattlesnakes (*Crotalus scutulatus*), and prairie rattlesnakes (*Crotalus viridis*) are common in the southwestern United States and it is often hard to distinguish one from another where they occur sympatrically. Similar, and sometimes ambiguous, morphological characteristics are commonly used to identify these species, such as differences in tail banding and number of intersupraocular scales. *Crotalus atrox* x and *C. scutulatus* have hybridized in captivity but rarely in the wild. Evidence for hybridization is limited for *C. atrox* and *C. scutulatus* in Arizona, New Mexico, and Texas. A narrow hybrid zone was distinguished in Hildalgo County, southwestern New Mexico of *C. scutulatus* x *C. viridis*. *Crotalus atrox* also occurs in this hybrid zone, but previous genetic analysis provided no evidence of hybridization with the other two species. Hybridization of rattlesnakes has not been analyzed in west Texas since the 1970s. This study serves to confirm the lack of hybridization between the three species using modern molecular techniques, and to analyze habitat use. It is predicted that lack of hybridization is due to differences in habitat preferences among the species which decreases interactions.

- 9:00 024.181 N **Ticks on toads: first report of exotic ticks (*Amblyomma rotundatum*) parasitizing invasive cane toads (*Rhinella marina*) in Hawaii**, Crystal Kelehear, Sul Ross State University; Cameron Hudson, University of Sydney; James Mertins, USDA - APHIS; Richard Shine, University of Sydney  
Our surveys of 1401 invasive cane toads (*Rhinella marina*) from the Hawaiian islands of Hawai'i, O'ahu, and Maui revealed the presence of an exotic tick, *Amblyomma rotundatum*. Immature and adult female ticks infested three wild adult toads at a single site in the vicinity of a zoo south of Hilo, Island of Hawai'i, Hawai'i, USA. We found no tick infested toads on O'ahu or Maui. This tick infests cane toads in their native Neotropical range, but it was excluded from Hawai'i when the original founder toads were introduced over 80 years ago. The circumstances of our discovery suggest that *A. rotundatum* was independently and belatedly introduced to Hawai'i with imported zoo animals, and Hawai'i now joins Florida as

the second U.S. state where this tick is established.

**025. Poster Presentation and Judging for: Biomedical; Cell & Molecular Biology; Chemistry & Biochemistry; Marine Science; Systematics & Evolutionary Biology.**

10:00 am to 12:00 pm

Marie Hall Building, Corridor B

Biomedical Sciences

Biomedical Sciences Poster Session

Participants:

025.183 U **A hybrid regulator in the TetR family with predictable properties in DNA-binding and allosteric response**, Ben Jordan, University of Texas at Tyler; Rey Preston Dimas, UT Tyler; Clement Chan, University of Texas at Tyler

The use of synthetic biology to engineer novel microorganisms has the potential offer a variety of solutions in today's medical industry. Transcriptional regulators in the TetR family are well understood and can be utilized to construct specific genetic circuits that behave in accordance to molecular inputs. Here we develop a hybrid regulator, by combining a DNA-binding module from TetR with a ligand-binding module from MphR, to produce a dynamic signal detection and response pathway among the cellular circuitry of *Escherichia coli*. Upon induction by small molecules, experiments show that the hybrid regulator constructed can detect and respond to changes in its environment. The modular aspects of hybrid regulators have the potential to serve a greater purpose in medical applications, where biospecificity in sensation is critical to treatment. By exhibiting the suitability of the TetR family for biological circuit construction, we can extend the threshold for what is feasible in cellular engineering.

025.184 U **Antibacterial effects of organic plant extracts**, Marlynn Cadena, University of Texas at El Paso; Homero Ivan Dominguez, University of Texas at El Paso; Delfina Dominguez, University of Texas at El Paso; Rachid Skouta, University of Texas at El Paso; Carlos Valenzuela, University of Texas at El Paso  
Antibiotic resistance is a public health crisis because microbial infections are harder to treat due to the innovative tactics to resist treatments and the limited number of new antibacterial being developed. The continued use of antibiotics has produced an overwhelming amount of antibiotic resistance leading to developing risks such as multi-drug resistant organisms (MDROs) that require novel methods to treat microbial infections. The objective of the study is to investigate the antibacterial activity of a collection of plant extracts against multi-resistant isolates from hospitals in El Paso, Texas and Cd. Juarez. The organic compounds were extracted from a library of plants. After extraction and filtration, the Kirby-Bauer test was used to test the susceptibility of the bacteria to the plant extracts. The results concluded that the oregano leaves extract in Dichloromethane showed inhibition in

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*Enterobacter cloacae* (13mm, 9mm), *Escherichia coli* (13mm), *Listeria monocytogenes* (10mm) and *Staphylococcus aureus* (23mm, 8mm) at concentration of 100mg/ml and 50mg/ml. The oregano leaves extract in Methanol showed inhibition in *Enterobacter cloacae* (10mm), *Escherichia coli* (9mm and 5mm), *Listeria monocytogenes* (14mm) and *Staphylococcus aureus* (19mm, 16mm) at concentration of 100mg/ml, but did not inhibit *Listeria monocytogenes* or *Enterobacter cloacae* at the concentration of 50mg/ml. In conclusion, the plant extracts show antibacterial properties and further work will determine the minimum inhibitory concentrations of the extracts.

**025.185 U Counteracting the negative effects of Imidacloprid using autophagy-inducing mechanisms**, Astrid Romero, St. Edwards University; Garrett Taurus, School of natural sciences

Imidacloprid is a neonicotinoid that binds to the post-synaptic nicotinic acetylcholine receptors (nAChRs) of organisms. This binding blocks nAChRs and prevents acetylcholine-dependent neurotransmission, which eventually desensitizes the receptor, leads to paralysis and ultimately death. The concern with this widely-used pesticide is that it affects non-target organisms, such as humans, and can negatively impact the environment. Autophagy is a regulated cellular mechanism that removes unwanted toxins and dysfunctional organelles under inducible conditions. The compound, rapamycin, and hypoxia preconditioning (<1% O<sub>2</sub>) were shown to induce autophagy. Thus, we hypothesize that autophagy may protect organisms from the toxic actions of imidacloprid. To test this hypothesis, *Caenorhabditis elegans* nematode behavior was studied under four conditions: (1) DMSO, LB agar with *Escherichia coli* OP50 (bacterial food strain, LB-OP50), nematode growth medium (NGM), (2) rapamycin, DMSO, imidacloprid (3) NGM, LB-OP50, hypoxia preconditioning, and (4) NGM, imidacloprid, hypoxia preconditioning. Our results demonstrated that hypoxia preconditioning on its own had positive effects on *C. elegans*, however, it did not alleviate the negative effects of imidacloprid. DMSO and rapamycin treatments both showed similar results for all assays. DMSO with and without rapamycin decreased motility. Future plans include having a control group of *C. elegans* affected purely by imidacloprid, in order to compare the results. Also, further research as to why hypoxia preconditioning proved to be ineffective in regards to imidacloprid is needed.

**025.186 U Cytokine profiling of pre-clinical and clinical cancer studies**, Valerie Gallegos, University of Texas at El Paso; Armando Estrada, Post Doctoral Fellow at University of Texas at El Paso; Valeria Rolih, Graduate student; Paloma Valenzuela, Graduate student at University of Texas at El Paso; Karla Parra, Graduate student at University of Texas at El Paso; Georgialina Rodriguez, -; Marian Manciu, -; Giulio

Francia, University of Texas at El Paso; Robert Kirken, -

To increase our understanding of the impact of metronomic chemotherapy on various cancer types, we have employed a multiplex immunoassay approach to evaluate the human plasma levels of various cytokines after administration of different drugs. To date we have analyzed plasma samples of colorectal cancer patients treated with a metronomic cocktail that included cyclophosphamide, and of prostate cancer patients treated with metronomic vinorelbine. Our results show that in colorectal cancer patients the levels of cytokines interferon-alpha2 (>55.11pg/ml) and IL-17a (<15.1pg/ml) were predictive markers for those patients with a better response to therapy as assessed by progression-free survival (p<.05 for each cytokine). Variable levels of IL-6, IL-8 and TNF-alpha, were detected in prostate cancer patients treated with metronomic vinorelbine – a preliminary result that we are investigating further. Thus far, our results indicate that specific cytokine levels in colorectal cancer patients are indicative of a better progression free survival. We are now evaluating whether similar results can be obtained in prostate cancer patients treated with metronomic vinorelbine, and if analogous patterns in cytokine levels are observable in preclinical mouse tumor models following metronomic chemotherapy administration.

**025.187 U Heat's role as a mechanism of dynamic stretching**, Matthew Boineau, Concordia University Texas; Rachel Boice, Concordia University Texas; Cory Smith, Concordia University Texas; Mary Kay Johnston, Concordia University Texas

Before exercise, athletes perform different types of warm-up routines. Typically, this involves some variation of stretching. Static stretching has long been the standard pre-exercise protocol, but recent studies point to dynamic stretching as being more beneficial in measures such as force generation (Curry, et. al, 2009), agility, and reaction time (Chatzopolous, 2014). However, the reason why dynamic stretching causes these positive physiological effects has not been investigated. Previous studies have suggested that increased muscular temperature from dynamic stretching leads to increases in nerve conduction velocity, enzyme cycling, and muscle compliance (Behm et. al., 2015). With this in mind, our study hypothesized that an increase in muscular temperature after dynamic stretching would lead to more forceful and rapid muscular contractions. Nine undergraduate volunteers completed 3 treatments: no treatment, passive heating of the thigh, and dynamic stretching. After treatment, the temperature of participants' dominant-leg vastus lateralis was taken. Participants then performed one leg extension while electrical activity (using an EMG) and angular acceleration (a proxy for force) were assayed. Our results showed a tendency for angular acceleration to increase as the

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muscular temperature increased. Interestingly, passive heating showed similar angular acceleration production to dynamic stretching but with a significantly lower frequency of electrical conduction across the muscle. This may indicate that passive heating, while producing similar increases in muscle force as dynamic stretching, requires fewer neurons to fire and less motor unit recruitment.

**025.188 U Reducing some physiological stress effects by exercising,** *Caleb Austin Maddox, Concordia University Texas; Mary Kay Johnston, Concordia University Texas*

Research shows that over 75% of Americans suffer from the negative physiological and emotional effects of chronic stress, and habitual aerobic exercise has been shown to reduce some of these effects by raising blood oxygen levels in the body (Perry, 2013). We sought to find a relationship between aerobic exercise, blood oxygen levels, and some negative effects of stress (such as reaction time and brain activity). We examined how short-term exercise affected blood oxygen, cognitive function through reaction time testing, and electroencephalogram (EEG) brain wave activity. Subjects were instructed to participate in three exercise treatment levels on different days: resting, jogging at 4mph, and running at 7mph, each for a period of five minutes. Before and after each treatment, blood oxygen percentage was recorded, and subjects took part in reaction time tests. Additionally, subjects' brain wave activity was recorded using an EEG before and after exercise. The difference between final and initial measurements was obtained, and statistical analysis was performed using repeated measures ANOVA. We found that blood oxygen immediately post-exercise significantly decreases with increased exercise, though reaction time does not significantly differ. We also found a slight increase in alpha brain waves and a slight decrease in beta brain waves. These trends may indicate that short-term aerobic exercise might reduce some negative effects of stress.

**025.189 U The discovery of novel inhibitors for *K. pneumoniae* Carbapenemase (KPC-2) using high-throughput virtual screening,** *tu nhat nguyen, university of texas; Josh Beckham, Research Educator*

Pneumonia is a type of acute respiratory tract infection that causes the build-up of fluid in the alveolar sacs, preventing the natural intake of oxygen into the blood. The infection is commonly considered as a nosocomial infection. One species, *Klebsiella pneumoniae* has been known to be proportionally responsible for a number of nosocomial infections, specifically pneumonia. Carbapenem, a broad-spectrum,  $\beta$ -lactam derived, antibiotic, has been commonly used as the 'last-line agent' against *K. pneumoniae*. The overuse of the carbapenem has led to the natural adaptation of *K. pneumoniae* carbapenamase (*blaKPC2*), a resistant gene. To prevent the hydrolysis carbapenem,

competitively novel inhibitors are currently explored. *In silico*, High-throughput virtual screening is used for the prediction of possible novel inhibitors; meanwhile, the inhibitive capability of the novel compounds is experimentally determined *in vitro*. A set of positive controls, known-binders, and random controls, non-binders, was docked against a crystal structure (PDB: 5EEC) of KPC-2 using two separate programs – GOLD and ICM. A compound-by-compound comparison of the two validation dockings shows that GOLD does a considerable job in docking apo-protein. A total of three compounds – ZINC11719824, ZINC14542896, and ZINC95510978 - were selected based on their favorable ChemScore. *In vitro*, the protein was successfully overexpressed and purified. Initial rounds of differential scanning fluorimetry (DSF) indicated that, at a suitable concentration of 5  $\mu$ M, KPC2 has a melting temperature of 55°C. A series of enzyme assays are being conducted with a substrate-analog nitrocefin, a hydrolysable substrate, in order to determine the  $K_m$  of KPC2.

**025.190 U Therapeutic organotin compounds against *Leishmania major* and *Trypanosoma cruzi*,** *Itzel Amacalli Tejeda, University of Texas at El Paso; Rosa Maldonado, University of Texas at El Paso; Keith Pannell, University of Texas at El Paso*

*Leishmania major* (*L. major*) and *Trypanosoma cruzi* (*T. cruzi*) are parasitic infections that affect millions of people, but are often placed in the class of "neglected diseases" since it primarily impacts poor societies. Thus, the development of low-cost, effective, new drugs that can treat such infections is imperative. Organotin compounds have been proven to be broad and potent biocides against eukaryotic infections ranging from fungicides to acaricides. However, the use of these compounds against such parasitic infections has not been investigated, possibly due to their immunotoxicity. For this project a novel immuno safe organotin compound [MeS(CH<sub>2</sub>)<sub>3</sub>]<sub>2</sub>SnCl<sub>2</sub> was evaluated and compared to commercially available organotin compounds such as Ph<sub>2</sub>SnCl<sub>2</sub>, (butyl)<sub>2</sub>SnCl<sub>2</sub> and (octyl)<sub>2</sub>SnCl<sub>2</sub>. *L. major* luke and *T. cruzi* CL Brener were the mutant strains used for this project, since they have been modified to express luciferin which creates bioluminescence in the presence of luciferase. Our preliminary assays provided evidence of toxicity against *L. major*; however, at the relatively high concentrations, ~ 3-4 mM. To date the materials exhibited no useful effectiveness against *T. cruzi*. Future work involves testing cell viability, and targeting the different parasitic stages.

**025.191 U Toxicity of virus like particles in *Danio rerio*,** *Olivia Gean Brandenburg, University of Texas at Tyler; Bridget A. Fitzgerald, University of Texas at Tyler; Brent R Bill, University of Texas at Tyler*

14 million people are diagnosed with cancer each year, it affects people of all ages, ethnicity, and backgrounds.

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This illness causes abnormal growth of cells at a rapid uncontrolled rate that can subsequently metastasize to other parts of the body. Though treatment options are available, many cause severe side effects that negate positive progress seen in a patient. In particular, chemotherapy has these affects, as it targets all dividing cells, not just cancerous ones. Virus like particles (VLPs) are composed of self-assembling proteins that form a capsid-like structure and can deliver cargo to specific cell types. The use of VLP delivered chemotherapeutics may offer a solution to this problem by acting as a novel and cell specific drug delivery system. In order to test this hypothesis, zebrafish will be used as a model organism; however, the toxicity of VLPs in zebrafish has not been previously reported. To determine toxicity, VLPs were injected into zebrafish single cell embryos at different concentrations. Viability, heart rate, and morphological changes were noted over a period of five days. To conclude, the fish were fixed in paraformaldehyde and stained with Alcian Blue to determine if cartilage was affected. It was found that lower doses of VLPs have minimal toxic effects on zebrafish. Future work will investigate the ability of VLPs to target specific cancer cells and act as a delivery system for chemotherapeutics.

**025.192 U Virtual Screening for novel inhibitors of *Plasmodium vivax* 6-phosphogluconate dehydrogenase**, *Geovanny Antonio Zarceno, 1997; Josh Beckham, Research Educator; Walter Fast, Principal Investigator*

6-Phosphogluconate dehydrogenase (6PGD) is a vital enzyme in the pentose phosphate pathway that converts 6-phosphogluconate to ribulose-5-phosphate. It can also serve as a potential drug target for *Plasmodium vivax*, a prominent malaria parasite that is transmitted by the *Anopheles* mosquito, infecting 19-50 million people in developing countries each year. Targeting the activity of this enzyme may decrease the survival of this protozoan parasite by inhibiting its ability to synthesize nucleotides and produce energy via glycolysis. To find a potential therapeutic molecule, virtual drug screening was used as a cost-effective method to make predictions about which compounds have the best binding affinity for the active site of 6PGD. A control set of compounds was used to validate the molecular docking software for this enzyme. Soon after, large libraries of over 25,000 compounds were screened and the top-scoring compounds were selected then filtered by Lipinski's Rule of 5. To make protein for the validation of these top compounds in inhibition assays, *Plasmodium vivax* 6PGD coding DNA sequence was cloned into the pNIC-Bsa4 expression vector, expressed in BL21(DE3) Competent *E.coli* cells, and purified using His Tag Protein Purification (Ni-NTA) and Anion Exchange Chromatography. Differential Scanning Fluorimetry (DSF) was used to determine the melting point of the enzyme and the binding affinity of the ligand to the

active site. Enzyme and inhibition assays of 6PGD were also done with the selected compounds and the purified protein to determine if the compounds changed the enzyme activity of 6PGD.

Cell and Molecular Biology

Cell & Molecular Biology Poster session

Participants:

**025.193 U Altered maintenance of hematopoietic cells by hydroquinone-treated S17 stromal cells**, *Joyce Nawara, Texas Lutheran University; Stephanie Perez, Texas Lutheran University*

Hematopoietic diseases, such as leukemia and myelodysplastic syndrome (MDS), result from improper production of hematopoietic cells. Leukemia and MDS have been shown to have genetic factors, as well as environmental factors, that contribute to the development of these diseases. One specific environmental factor that is associated with an increased risk of leukemia and MDS development is benzene. One important metabolite of benzene is hydroquinone. Research during the past couple of decades has shown that the bone marrow microenvironment can also be a contributing factor of leukemia and MDS development, progression, and reoccurrence. Previous projects in our lab have focused on determining the effect of hydroquinone on S17 stromal cells, a cell line that mimics the bone marrow microenvironment in culture. For this study, we look to analyze if treating S17 cells with hydroquinone alters their ability to maintain normal hematopoietic cells isolated from bone marrow. To test this, we performed two co-culture assays in which hydroquinone-treated (1.25  $\mu$ M or 10  $\mu$ M) and untreated S17 cells were overlaid with bone marrow cells for 4, 8 or 12 days. Then the ability of the co-cultured bone marrow cells to form colonies was assessed in methylcellulose medium. Based on the two co-culture experiments, the ability of hydroquinone-treated S17 cells to support bone marrow cells was altered compared to untreated S17 cells.

**025.194 G Antimicrobial properties of moderate halophiles isolated from soil surrounding a hypersaline lake**, *Eduardo de la Garza, University of Texas Rio Grande Valley*

Halophiles are prokaryotic organisms that are able to tolerate saline environments such as salt lakes. Some of these microorganisms are able to inhibit the growth of other microbes by the production of secondary metabolites. Halophilic microbes were isolated from La Sal del Rey, a hypersaline lake in south Texas, USA and were tested against one another for antimicrobial properties. 32 samples were taken from 16 sites spaced 30 meters apart from each other in a 4x4 grid. 16 samples were placed in sterile centrifuge tubes and kept under ice while the other 16 samples were taken for soil analysis and were placed in plastic bags. Soil underwent a seven-fold dilution and was streaked on a specialized growth medium developed for moderate

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halophiles. Microbial colonies were then isolated and grown in liquid and solid medium. Isolates were selected and tested using an inhibition assay against one another in order to determine the production of any antimicrobial compounds. Results will be discussed in the poster presentation.

**025.195 U Characterization of cancer hallmarks in PA28 $\gamma$ -/- cancer clones and A9 tumor cells, Estefany Zambrano, Austin College; Bethany Bundrant, Austin College; Lance Barton, Austin College**

Cancers make up a diverse family of diseases, with each individual cancer following a unique pathogenesis. While this results in significant variation between cancers, there are characteristic hallmarks shared by all. Understanding the various molecular mechanisms through which cells obtain these hallmarks is important. PA28 $\gamma$  is a proteasome activator that stimulates the degradation of proteins in an ATP- and ubiquitin-independent manner. Elevated expression of PA28 $\gamma$  has been observed in various cancers. Cells deficient in PA28 $\gamma$  were mutagenized and selected for their acquisition of anchorage independence, a phenotype exhibited by many cancer cells. In order to determine the extent to which these mutagenized PA28 $\gamma$ -/- "Cancer Clones" had taken on cancer-like characteristics, this investigation examined genomic instability, sensitivity to anticancer drugs, and invasive capabilities. These hallmarks were also investigated in the A9 tumor cell line. A mutation in one or more of the H-ras, akt1, and p53 genes is common in many types of cancer. This investigation found that the genes H-ras and p53 were unaltered in A9 and PA28 $\gamma$ -/- Cancer Clones, however, an A5P mutation was observed in Akt1 in A9 cells. A9 cells exhibited the highest degree of genomic instability and invasiveness, while PA28 $\gamma$ -/- Cancer Clones exhibited a phenotype intermediate between A9 and negative controls. Neither the PA28 $\gamma$ -/- Cancer Clones nor A9 cells exhibited sensitivity to the anti-cancer drugs tested. Taken together, these data suggest that A9 tumor cells exhibit cancer-like characteristics to a greater degree than PA28 $\gamma$ -/- Cancer Clones, however, both cell lines exhibited more cancer-like characteristics than controls.

**025.196 U Cytotoxicity of *Cinnamomum verum* (Cinnamon) and *Salvia officinalis* (Sage) in 4T1 Murine breast cancer cells., Makayla Nicholson, Wayland Baptist University; Alana Quackenbush, Wayland Baptist University; Ethan Nicholson, Wayland Baptist University; Adam Reinhart, Wayland Baptist University; Robert L Moore, Wayland Baptist University; Gary O. Gray, Wayland Baptist University**  
Previous studies in our laboratory have focused on the anti-inflammatory properties of extracts from medicinal plants. Extracts from several of these plants were found to have components cytotoxic to cultured 4T1 murine breast cancer cells. In this work, ethanolic extracts from 30 medicinal plants, plants previously unstudied

in our laboratory, were evaluated to determine the effects of these extracts on cultured 4T1 murine breast cancer cells. These effects were measured using Cell Titer-Glo luminescent cell viability assays. The ethanolic extracts of *Cinnamomum verum* (Cinnamon) and *Salvia officinalis* (Sage) were found to be cytotoxic to the 4T1 breast cancer cells as compared to a control epithelial cell line (EpH4-Ev). Work is ongoing to purify the cytotoxic components of these plants and to determine the mechanism(s) by which these components induce 4T1 breast cancer cell death.

**025.197 U Detection of mutations in the sodium channel of *Rhipicephalus microplus* using High Resolution Melting Analysis, Ariel Delgado, University of Texas Rio Grande Valley; Guilherme Klafke, USDA-ARS Cattle Fever Tick Research Laboratory; Jason Tidwell, USDA ARS Cattle Fever Tick Research Facility; Robert John Miller, USDA-ARS Cattle Fever Tick Research Laboratory; Adalberto Perez De Leon, U.S. Department of Agriculture**  
The Cattle Fever Tick (CFT), *Rhipicephalus microplus*, is a single-host tick. CFT has the largest economic impact on livestock husbandry costing the agriculture industry billions of dollars each year. The tick distribution occurs in tropical and subtropical areas, for this reason, outbreaks are still present in the southern regions of Texas and its boundary with North East Mexico, which has been established as a permanent quarantine zone for CFT. Pyrethroids are an acaricide class used to control CFT infestations. The unbounded use of pyrethroids in Mexico has led to resistance in CFT populations. The US imports over 1 million head of cattle from Mexico every year and having a rapid detection for pyrethroid resistant ticks is critical for a CFT control program. Tick samples were taken from livestock at the ports of entry into the US from Mexico. Forty-eight samples were tested using high resolution melt analysis for pyrethroid resistant genotypes. This real-time PCR technique is fast and versatile where new mutations can also be detected. Primers for the voltage-sensitive sodium channel were used to amplify regions of the gene that contain target site mutations. We used resistant and susceptible references from the colonies at the Cattle Fever Tick Research Laboratory as controls. Acaricide resistant genotypes were identified in the comparative analysis of melting curves of amplicons. This method provides a new path to identify other mutations that provide acaricide resistance. The research of this procedure can serve as a basis to plan outbreak control strategies.

**025.198 U Evaluation of the breast epithelial cell line EpH4-Ev as a non-tumorigenic control to the 4T1 tumorigenic breast cancer cell line, Alana Quackenbush, Wayland Baptist University; Makayla Nicholson, Wayland Baptist University; Gary O. Gray, Wayland Baptist University; Adam Reinhart, Wayland Baptist University**

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Previous studies in our laboratory have utilized the widely used 4T1 murine breast cancer cell line to investigate cytotoxic and apoptotic effects of anti-inflammatory plant extracts and specific molecules isolated from these extracts. Although we have found numerous potential chemotherapeutic agents from plant extracts, these studies suffer from a lack of specificity. The most effective chemotherapeutic agents would exhibit a higher degree of cytotoxicity or induce apoptosis in cancer cells but not their non-tumorigenic counterparts. In this study, we have used the non-tumorigenic EpH4-Ev cell line. EpH4-Ev cells are an immortalized, but non-tumorigenic murine breast epithelial cell line we tested for suitability as our "normal" control. We compared cytotoxic and apoptotic effects of various plant extracts on EpH4-Ev and 4T1 cells to determine if some plant extracts preferentially killed 4T1 cancer cells as opposed to a EpH4-Ev cell line. We found that some plant extracts were more cytotoxic to 4T1 cells than to EpH4-Ev cells, and some exhibited no difference. Additionally, we found through western blot analysis, that ginger extracts caused 4T1 cells, but not EpH4-Ev cells to activate Caspase-3 suggesting apoptosis was induced. Our conclusion is that the EpH4-Ev cell line is a valuable control cell line for comparison to 4T1 cells. In the future, we will be able to focus our research on molecular constituents of plants which are more cytotoxic to 4T1 tumor cells than the non-tumorigenic EpH4-Ev cell line.

025.199 U **Identifying potential *Bacillus thuringiensis* candidates to control *Aethina tumida*.**, Gilberto Vento, University of Texas Rio Grande Valley

Honeybees are important due to their role in the pollination of a large amount of crops helping the billion dollar agriculture industry thrive. However, there are several factors that are contributing to Colony Collapse Disorder (CCD) which is wiping out entire honeybee hives. Some of these factors include: Varroa destructor (varroa mites), *Aethina tumida* (hive beetles), wax moths and widespread use of neonicotinoids. Hive beetles are pests that invade hives of honeybees and allow their larvae to burrow their way through the combs feeding off the honey and pollen stored by the honeybees; anything that they leave behind is also contaminated through their feces. An infestation of hive beetles can drive out even strong colonies from their hives. *Bacillus thuringiensis* (Bt) and its toxins have been used on major crops such as corn to control pests from eating and ruining the crop. If this same agent is sprayed on the combs or the bottom of the frames in beehives then maybe these hive beetles can be controlled without the use of dangerous pesticides that can harm the honeybees or contaminate the honey. Some Bt strains are approved for use against wax moths. Traditional methods to find Bt involve looking for it in the environment in which the pest is found. If this is correct, we hypothesize that we will find strains

against hive beetles in and around hives or small hive beetle carcasses. We report on our findings to date.

025.200 U **Investigating the effects of p53 mutations on cancer phenotypes in transformed MEF cells**, Janani Ramesh, Austin College; Emily Bourcier, Austin College

Cancer is an accumulation of mutations in cells. Typically, cancers exhibit specific phenotypes known as the Hallmarks of Cancer; six hallmarks have been identified and include replicative immortality, invasion and metastasis. The protein p53 has a key role in numerous pathways that are known to contribute to these hallmarks. Four cell lines, control mouse embryonic fibroblasts (MEF), mutated mouse embryonic fibroblasts, or cancer clones (CC), carcinogenic mouse fibroblasts (A9), and carcinogenic mouse mammary cells (M158), were studied to understand how mutated p53 can manifest into cancer phenotypes. These lines were tested to characterize the CC line on the continuum of increasing tumorigenic capacity. All four cell types had a mutation in the p53 coding region, however the nature of the mutations varied. Upon investigation of cancer hallmarks such as genomic and genetic instability, invasion/metastasis potential, and resistance to cell death/pro-apoptotic signals, experimental results from karyotyping, gene sequencing, and migration assays favored the prediction that the CC cell line behaved more similarly to the MEF cell line, the precursor cell type to the transformation, than the carcinogenic A9 and M158 cell lines. This was true of genetic and genomic instability, and invasion/metastasis phenotypes. A single mutational event is unlikely to result in a fully formed cancer cell, but would rather require a series of mutational events to overwhelm the ability of cells to self-regulate.

025.201 U **Investigating the role of PA28 $\gamma$  in NF $\kappa$ B-mediated inflammatory and cancer responses**, Hannah Butterfield, Austin College; Trung Nguyen, Austin College; Emma Thornburg, Austin College; Brian Nguyen, Austin College

NF $\kappa$ B is constitutively induced in multiple cancer types and is linked to avoidance of apoptosis, increased metastasis and proliferation, and the immune response. NF $\kappa$ B family members are regulated by the Inhibitor of  $\kappa$ B (I $\kappa$ B) family members, which hold NF $\kappa$ B inactive in the cytoplasm. Activation of NF $\kappa$ B can be achieved through degradation of I $\kappa$ B by proteasomes, followed by dimerization of NF $\kappa$ B for subsequent nuclear translocation and signaling. PA28 $\gamma$  is a proteasome activator that is frequently dysregulated in cancer and may regulate NF $\kappa$ B activity. PA28 $\gamma$  has been previously associated with NF $\kappa$ B activity by promoting I $\kappa$ B degradation, and also through stabilizing the interaction of NF $\kappa$ B with its transcriptional co-activator p300. Here, we further study potential impacts of PA28 $\gamma$  on the NF $\kappa$ B pathway by assessing the levels of various implicated proteins in PA28 $\gamma$ -/- cells, as well as

by assessing differences in NF $\kappa$ B transcriptional activity through downstream gene targets.

**025.202 U Pyruvate dehydrogenase complex related genes are differentially expressed between neonatal and adult cardiomyocytes**, *Emily L Ensley, University of Mary Hardin-Baylor; Joni H Ylostalo, University of Mary Hardin-Baylor*

Neonatal mice can regenerate their hearts following various types of injury, challenging the concept that mammalian hearts cannot undergo significant regeneration. Understanding differences in metabolism related gene expression between neonatal and adult mice could reveal a role in their regenerative capacity. The Pyruvate dehydrogenase complex (PDC) is responsible for converting pyruvate to acetyl-coA. The inhibition of PDC results in the heart relying mainly on fatty acids instead of glucose as its primary energy source, which can lead into cardiomyocyte cell cycle exit because of oxidative DNA damage. A recent publication generated a readily available large gene expression data set of various cell types isolated from non-infarcted and infarcted neonatal and adult mice hearts. The goal of this research was to use bioinformatics tools to study the expression of genes related to the PDC in neonatal and adult mice cardiomyocytes. The expression of genes involved in the PDC were obtained from a list of differentially expressed genes in neonatal and adult mice with or without myocardial infarction. Mined data was used in PathVisio software to illustrate a pathway that displays PDC related genes that were significantly up- or down-regulated in the data set. While there was little change in the expression of PDC related genes between non-infarcted and infarcted hearts, significant differences were detected when comparing PDC related gene expression between neonatal and adult mice. These findings suggest the involvement of PDC regulation in heart regeneration.

**025.203 U Regulatory mechanisms dictating the activity of post-translational modification systems in mammalian cells**, *Carlos Oscar Ontiveros, The University of Texas at El Paso; Arely Diaz, The University of Texas at El Paso; Germán Rosas-Acosta, The University of Texas at El Paso*

Mammalian cells have developed effective response mechanisms to survive a wide range of environmental stresses. Among those response mechanisms, post-translational modifications (PTMs) appear to constitute critical mediators required for cell survival during stress. Remarkably, the activity of the most critical PTMs appear to be dramatically enhanced under stress. However, little is known about the mechanism underlying the increases observed. While transcriptional regulation plays an essential role in modulating overall gene expression in mammalian cells, our current knowledge indicates that transcriptional regulatory mechanisms appear to play a

very limited role in regulating the activity of most PTM systems in the cell. These findings suggest a role for post-transcriptional regulatory mechanisms as the main modulators of the activity of PTM systems in the cell. One of the most important post-transcriptional mechanisms for controlling gene expression is alternative splicing. Alternatively spliced gene transcripts may lead to complex feedback mechanisms that can have profound effects in their expression. Through polyribosome profiling and quantitative PCR, we have demonstrated that the transcript for one important post-translational protein modifier undergoes alternative splicing and is therefore likely to produce alternative gene products that could modulate various processes in the cell and demonstrate cell line specificity. Such gene products may be differentially regulated, thus playing unique roles in the cellular stress response. Enhancing our understanding of these critical mechanisms could lead to the development of novel therapies for illnesses that cause cellular stress such as viral infection and stroke.

**025.204 U Seasonal variation of the Honey Bee honey stomach microbiome**, *A H M Zuberi Ashraf, Student; Laura Weiser Erlandson, Texas A&M University - Central Texas; Allyson K Martinez, TAMU*

The digestive tract of honeybees contains a specialized organ called the honey stomach that functions to process nectar into honey. Honey produced by different bee hives varies considerably in appearance, taste, and commercial viability due to its chemical composition. Furthermore, the microbiome of the honey stomach may influence the compositional makeup of the honey. Previously, we have seen that there is a difference in the microbiome content between the gastrointestinal tract and the honey stomach. In addition, it is known that the microbiome of the honey stomach contributes to the composition of honey. The aim of this study is to determine if there is a seasonal difference in the microbiome content of the honey stomachs. We determined the composition of the microbiome communities of the honey stomachs of four different honey bee hives through dissection and removal of the honey stomachs. The microbiomes of each sample were characterized by 16S rRNA amplification and sequencing, and analyzed using QIIME. There was a difference in the microbiome content between Fall 2016 and Spring 2017 samples. This difference may be a result of several factors such as mutation, source of nectar, different seasonal flowers, presence of parasites or pathogens, insecticidal or antimicrobial treatments, or differences in diet.

**025.205 U Tumor growth monitoring of orthotopic colon cancer model**, *jose lopez, University of Texas at El Paso; Giulio Francia, University of Texas at El Paso*  
To explore the potential impact on colon cancer growth of low-dose chemotherapy regimens we generated orthotopic models of the human HT29 cancer cell line

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in immunodeficient mice. HT29 cells were transfected to express GFP (Green Fluorescent Protein), and human chorionic gonadotropin (hCG), and subsequently injected intracaecally into R2G2KO SCID mice. Tumors were monitored via luminescence reading and assessment of hCG levels in mouse urine. Luminescence and hCG readings allow for a non-invasive form of monitoring tumor growth. The models were then treated with metronomic therapy of gemcitabine (GEM). The development of HT29 orthotopic models that are readily monitorable could improve the preclinical evaluation of new therapeutic strategies.

**025.206 U Using colocalization studies to explore potential interactions between the *Drosophila* proteins Kinesin, Dynactin and Eip63E,** *Kaitlin Beettner, Schreiner University; Kara Miller, Schreiner University; Susan Klinedinst, Schreiner University*  
Dynactin is an important multi-subunit regulator of the microtubule motor dynein and regulates intracellular transport from fungi to humans. While important in most cells, dynactin function in the nervous system is of particular medical significance. The Glued subunit of dynactin is associated with multiple neurodegenerative diseases including distal spinal and bulbar muscular atrophy, Perry Syndrome and ALS. We previously performed a large-scale unbiased genetic screen identifying mutations in 250 genes whose partial loss-of-function either enhance or suppress the eye morphology defects in *Drosophila Glued* mutants. To focus on genes of likely relevance for motor disease, we further determined which of these mutations resemble *Glued* in yielding larval movement defects and axonal transport defects when combined with a mutation in *kinesin-1*. From this series of screens, we identified the kinase, Eip63E, which exhibits homology to a family of mammalian cyclin dependent kinases (Cdks) called PFTAIREs, whose function is currently poorly understood. Eip63E genetically interacts with both molecular motors, however it is unclear whether these proteins function together in the process of axonal transport. In order to address this question, we are performing colocalization experiments to compare the cellular distributions of fluorescently tagged Eip63E, dynactin and kinesin proteins in *Drosophila* S2 cells.

Marine Science

Marine Science Poster Session

Participants:

**025.207 U A methodological comparison of the Line Transect and the Randell-Robertson Marine Survey Technique,** *Grace Gonzalez, McLennan Community College - T.I.D.E.S Lab*

This comparison study was the first step in the validation of the RRMST using the LT method as the reference. Researchers predicted RRMST would be equally successful in the observation of coral species and disease coverage. This study was conducted in

Roatan, Honduras from May 15-19, 2017 along the Mesoamerican Reef. Five dive sites were surveyed twice using RRMST and LT method. A higher total frequency of the coral species was observed using RRMST rather than LT. There was a significantly more diseased *Stephanocoenia intersepta* and *Orbicella annularis* observed when utilizing RRMST. Data collection showed LT exhibited a higher standard error of frequency of diseased proportion over RRMST indicating those data had a higher variability. RRMST indicated a higher average proportion of diseased coral for most species and found more diseased *Siderastrea radians* individuals than the LT method. This pilot study was the first step in the validation of RRMST. The results of this study suggested an improved likelihood of locating healthy and diseased coral when applying RRMST. In future studies, researchers should standardize the depth and distance between the two protocols to help further validate the RRMST.

**025.208 U Annual reproductive cycle of Atlantic Sea Urchin in the Southern Gulf of Mexico,** *Eleazar Hernandez, University of Texas at Rio Grande Valley; Omar Vazquez, University of Texas at Rio Grande Valley; Andre Torruco, University of Texas at Rio Grande Valley; MD Saydur Rahman, University of Texas Rio Grande*

Sea urchins are among the oldest living sea creatures in the world. Sea urchins are unique invertebrates and differ from other organisms due to their notable lack of organs. The importance of sea urchins is often overlooked, yet they play major environmental and economic roles. Our research has been focused on Atlantic sea urchin, *Arbacia punctulata* important for seafood (e.g. Japanese Sushi). In order to acquire a better understanding of their population and to prevent their extinction, our objective is to determine the annual reproductive cycle of sea urchins in southern Gulf of Mexico waters. Annual changes in the oocyte (immature egg) and ova (mature egg) in the ovary, as well as sperm production in the testis of *Arbacia*, were investigated histologically. The gonadosomatic index (GSI, gonad weight/body weight\*100) values were high from May through August, significantly decreased in October, and were maintained at low levels until April. During summer months, the ovaries were occupied by mature eggs. Testes were also fully occupied by large amounts of sperm. These results suggest that *Arbacia* would start spawning several times for the following summer months in the southern Gulf of Mexico.

**025.209 N Association of Boring Organisms with Dark Spot Syndrome in Roatan, Honduras,** *Jennifer Novak, McLennan Community College - T.I.D.E.S Lab*  
Coral reefs are one of the most delicate and vulnerable ecosystems on the planet and coral disease outbreaks have occurred since the 1970's and have added to coral decline in the Caribbean. Dark Spot Syndrome (DSS) was first observed in Caribbean near Columbia during



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the late 1990's and since this relatively recent appearance, the relationship with coral and impact of DSS is still unidentified. DSS infected corals display lesions or variations in color on the coral tissues. The primary coral species affected with DSS in the Caribbean region are: *Siderastrea siderea*, *Stephanocoenia intersepta*, and *Siderastrea radians*. Many studies have indicated that a widespread decline in overall coral health has caused a global increase in the prevalence of boring sponge. This study was conducted to observe the association of boring organisms with Dark Spot Syndrome in Roatan, Honduras. There was no significant difference in coral health status based on the presence of sponges, the area of sponge coverage, coral area, water depth or dive site. The proportion of all coral species with disease varied significantly across coral size, water depth, and site. In future studies, researchers should strive for comparable sample sizes at each depth to thoroughly investigate possible relationships. Researchers should also investigate physical factors such as water chemistry, dive traffic and proximity to features including the island landfill and golf course which could affect reef health and susceptibility to disease. Additional dive sites on Roatan should be surveyed to increase the sample size and make results more easily generalized.

**025.210 H Community primary productivity patterns along a salinity gradient in the Lower Laguna Madre of Texas**, *Nicholas VanHee, The International Baccalaureate Program at Lamar Academy; Alejandro Vasquez, International Baccalaureate Program at Lamar Academy; Paulina Ocadiz, International Baccalaureate Program at Lamar Academy; Paulina Sanchez, The International Baccalaureate Program at Lamar Academy; Jessica Ayala, The International Baccalaureate Program at Lamar Academy; Alison McClellan, The International Baccalaureate Program at Lamar Academy; Hudson DeYoe, The University of Texas Rio Grande Valley; Joseph Lawrence Kowalski, The University of Texas Rio Grande Valley*

The Laguna Madre (LM) of Texas is an historically hypersaline lagoon along the Gulf of Mexico bordering several counties. The Arroyo Colorado (AC) is a mesohaline stormwater, agricultural and municipal drain that empties in to the LM. Both hyper- and hyposalinity can influence primary productivity. We examined the effect of salinity on primary productivity rates at four sites along a north-south transect during June 2017. There was a clear south to north geographic trend in primary productivity rates and salinity. Primary productivity was inversely related to salinity. Lowest rates were found nearest the southernmost Brazos-Santiago Pass (B-S) (salinity of 33; 0.94  $\mu\text{mol O}_2 \text{ hr}^{-1}$ ). Highest rates were at the confluence of the Lower LM and AC (2.50  $\mu\text{mol O}_2 \text{ hr}^{-1}$ ; salinity of 39). The mesohaline AC upstream site had the lowest mean rate (0.70  $\mu\text{mol O}_2 \text{ hr}^{-1}$ ; salinity of 18). Respiration rates

were nearly equal for all LM sites (0.20 to 0.17  $\mu\text{mol O}_2 \text{ hr}^{-1}$ ; salinity range of 33-39), but were more than three times greater in the mesohaline AC Upstream site. Water column inorganic nitrogen ( $\text{NO}_3^-$  and  $\text{NH}_4^+$ ) concentrations ranged from undetectable to 1.0 ppm. Secchi depth ranged from 80 cm nearest the tidal pass (B-S) to 23 cm at the AC Upstream site. Primary productivity and respiration rates at the AC Upstream site reflect the dual influences of salinity and water clarity. The AC, as a municipal drain, may carry a substantial bacterial load with correspondingly high respiration rates.

**025.211 U Comparison of analyses of ocean marine nutrients using commercial aquarium kits vs. established literature protocols**, *Micah Nathaniel Bigby, Midland College*

The concentration of nutrients, such as nitrate ( $\text{NO}_3^-$ ), nitrite ( $\text{NO}_2^-$ ), and ortho-phosphate ( $\text{PO}_4^{3-}$ ) in the waters above coral reefs are thought to affect their overall health and sustainability. There are long-established colorimetric assays for the measurement of these analytes in the laboratory, and so the choice has been to either transport water samples back to the home laboratory for analysis or transport an extensive battery of reagents to remote, often foreign, field locations for analysis on site. There are commercially available, over-the-counter, colorimetric aquarium nutrient analysis kits (based on the literature assays) which are easy to transport, convenient to implement, but are designed to give broad range results. It is of interest to whether these commercial kits could produce rigorous, quantitative, results comparable to the established assays. Standard solutions of nitrate ( $\text{NO}_3^-$ ), nitrite ( $\text{NO}_2^-$ ), and ortho-phosphate ( $\text{PO}_4^{3-}$ ) were prepared in artificial seawater (ASTM) and tested according to the established literature protocols as well as by the commercial kits using several types of optical instruments including: a Perkin Elmer UV-Vis spectrophotometer, Bio Rad 3550 microplate reader, Thermo Spectronic 20D spectrophotometer, and a MicroLab FS-32 LED spectrophotometer. Calibration curves show that comparable results can indeed be attained, albeit in very specific concentration ranges. Comparative analyses were performed on marine samples obtained from the coral reef waters at Roatan, Honduras and the analyte concentration results were in agreement.

**025.212 U Dermo presence in Lower Laguna Madre Oysters**, *Daniel Gonzalez, University of Texas Rio Grande Valley*

Oysters and clams play an important role in the shellfish industry in Texas and the industry is worth 148 billion dollars worldwide. The oysters (*Crassostrea virginica*) and clams (*Donax texasianus*, and *Chione elevata*) of the Lower Laguna Madre are filter feeders. Their value is important to both the ecosystem and also as possible candidate organisms for mariculture; thus it

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is important to understand the diseases that affect these bivalves. Oysters are often plagued by a disease known as Dermo, caused by *Perkinsus marinus* which has been found in the Lower Laguna Madre. Dermo is prevalent in warm waters. Natural infections are caused by parasites released from dead disintegrating oysters or by scavenger feeding on dead oysters. When oysters become infected, they can die anywhere up to three years after initial exposure and infection. We recently started looking at clams and discovered that Dermo affects them as well. Dermo diagnosis was done by culturing anal-rectal tissue in Rays Fluid Thioglycollate Media (RFTM). Oyster and clam samples, from the Lower Laguna Madre (LLM) were taken back to our laboratory and cultured in RFTM and stained for Dermo detection. Our hypothesis consisted of two main points; 1. Dermo is in the LLM, 2. Dermo affects other bivalves in the LLM. We plan to identify the *Perkinsus* species via PCR using published *Perkinsus* genera and species primers. We'll report on our findings and suggest future direction of research.

**025.213 U Development of a submersible sensor system for in-situ water quality measurements,**  
*Nicholas David Mastroianna, Midland College; Jeremy Lusk, Midland College; Greg Larson, Midland College; Brian Steven Flowers, Midland College*

Coral reefs make up less 0.1 % of the ocean surface, but are home to over 25 % of marine life. Bleaching events occur when environmental factors stress coral colonies and the endosymbiotic algae that give corals their color are expelled. Current methodologies for acquiring water quality data primarily come from collecting samples, with later analysis in a laboratory environment. Sensor pod systems were developed to assist researchers in better understanding what factors impact coral health. They are capable of withstanding hydrostatic pressure of over 60 feet of seawater, are neutrally buoyant, and able to measure various water quality parameters, including oxidation/reduction potential, temperature, pH, turbidity, dissolved oxygen, and conductivity. Furthermore, three separate pods were constructed to examine differences in water conditions based on depth. Sensors were purchased from Atlas Scientific, and controlled by an arduino uno. Data is backed up from the arduino to an encased raspberry pi microcomputer. A 20000 mAh lithium ion battery powers the sensor pod for up to 24 hours to capture a full diurnal cycle. The power and data acquisition systems are housed in a 12" long, 6" diameter, schedule 80 pvc pipe with one end capped and an accessible flange on the other. The sensor pods were utilized to collect water quality data at Bottomless Lake, New Mexico. This data set was corroborated with comparable measurements taken using an industry standard sonde sensor package. Current plans are to deploy in Roatan, Honduras, to study water conditions at both healthy and bleached coral sites.

**025.214 H Faunal diversity along a salinity gradient, Lower Laguna Madre, Texas,**  
*Jessica Ayala, The International Baccalaureate Program at Lamar Academy; Alison McClellan, The International Baccalaureate Program at Lamar Academy; Alejandro Vasquez, International Baccalaureate Program at Lamar Academy; Nicholas VanHee, The International Baccalaureate Program at Lamar Academy; Paulina Ocádiz, International Baccalaureate Program at Lamar Academy; Paulina Sanchez, The International Baccalaureate Program at Lamar Academy; Hudson DeYoe, The University of Texas Rio Grande Valley; Joseph Lawrence Kowalski, The University of Texas Rio Grande Valley*

Salinity can have a substantial effect on the distribution and abundance of fauna in estuaries. Stable salinities are expected around tidal passes. Higher salinities may be expected away from passes, especially in the historically hypersaline Laguna Madre (LM). The Arroyo Colorado (AC), a stormwater, agricultural and municipal drain, introduces low salinity water to the marine waters of the LM. Where the AC drains to the LM (AC Mouth), salinity may have a negative effect on the distribution and abundance of the fauna. We tested the effects of differing salinity zones on faunal distribution and abundance at four sites along a south to north transect using an otter trawl. Simpson's Diversity Indices were calculated to determine diversity indices for the four sites. A diversity index of 0.96 was found nearest the oceanic salinity of the Brazos-Santiago Pass (salinity = 33), but only had seven different species dominated by fish. The other LM sites had diversities of 0.45 (middle of transect) with six species dominated by xanthid crabs and 0.97 at the AC Mouth (eight species dominated by blue crabs; salinity = 39). The mesohaline Arroyo Upstream (salinity = 18) had a diversity index of 0.21 with six species dominated by catfish and blue crabs. The results indicate that the low salinity of the AC Upstream site may be a limiting factor to faunal diversity. Overall, diversity indices do not correlate with elevated diversity indices along the south to north axis of the LM.

**025.215 U Fish assemblages on the Mesoamerican Barrier Reef in Roatán, Honduras,**  
*Scheila Rene Corujo, Texas Tech University*

Composition of fish assemblages is recognized as an indicator of ecosystem health, habitat degradation, and ecosystem productivity. Fish community structure has been associated with coral coverage and diversity. Recent events, such as climate change, have caused extensive coral bleaching, resulting in a loss of habitat for fish and ultimately reduced fish abundance. This study was conducted to assess fish assemblages on the Mesoamerican Barrier Reef in Roatán, Honduras. The standard Roving Diver Technique was used to locate fish assemblages at two depths, 9.14 m and 15.24 m, across five dive sites. Fish communities were characterized for species presence and abundance and

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each dive site was sampled twice. The Kruskal-Wallis was used to determine the statistical significance between the two depths. The Shannon-Weiner index of diversity was used to measure the diversity between the two depths and the dive sites. Non-metric multidimensional scaling was used to look at how species composition varies by depth and dive site. We found no significant differences in species richness between the two depths surveyed ( $p = 0.93$ ); however, there was a significant difference between the study sites. Bear's Den had the lowest species diversity out of all the sites, and Fish Den had the highest species diversity. Fish Den and Pillar Coral each have a unique species composition which differ in comparison, to the other sites. This study provides a baseline description of reef fish community structure. Future studies can use these results to measure changes in community structure over time.

**025.216 U Gut content analysis of the Gulf Toadfish**  
*Opsanus beta*, Claire Adams, St. Edward's University

The Gulf toadfish, *Opsanus beta*, is mainly known for their metabolic plasticity and the ability to differentiate food from predators based on sonar sounds. They are mid-sized predators occupying seagrass habitats in Texas. They likely are top predators in this habitat and exhibit lie-in-wait behaviors. Little is known about their natural history, including their feeding habits, especially in Texas. This study investigated the feeding habits of the Gulf toadfish in Red Fish Bay, Texas. Toadfish were collected in the field, euthanized, and brought back to the lab and measure for individual length before dissection. Stomachs were removed, weighed, and emptied. Gut contents were quantified by numerical counting and identified via a dichotomous key. Preliminary gut content analysis indicated the toadfish diet consists of mainly crustaceans and fish. We currently are in the process of finalizing gut content analyses and results will be presented. Understanding diet preferences in the Gulf toadfish will shed light on feeding habits and trophic position of a top predator in seagrass ecosystems.

**025.217 U Methodological comparison of the Line Transect and the Randell-Robertson Marine Survey technique**, Brooke Allison, McLennan Community College TIDES Lab

A Methodological Comparison of the Line Transect and the Randell-Robertson Marine Survey Technique Grace Gonzalez, Brooke Allison, Brittlinn O'Quinn, Traesha Robertson<sup>2</sup>, Shannon Hill<sup>3</sup>, Stephanie Lockwood<sup>4</sup>, Donna Hamilton<sup>5</sup>, Stephanie Randell<sup>1</sup> McLennan Community College, Waco, Texas<sup>1</sup>; Texas Tech University at Waco, a Higher Education Teaching Site, Waco, Texas<sup>2</sup>; University of North Texas-Dallas, Dallas, Texas<sup>3</sup>; University of Coastal Georgia, Brunswick, Georgia<sup>4</sup> This comparison study was the first step in the validation of the RRMST using the LT method as the reference. Researchers predicted

RRMST would be equally successful in the observation of coral species and disease coverage. This study was conducted in Roatan, Honduras from May 15-19, 2017 along the Mesoamerican Reef. Five dive sites were surveyed twice using RRMST and LT method. A higher total frequency of the coral species was observed using RRMST rather than LT. There was a significantly more diseased *Stephanocoenia intersepta* and *Orbicella annularis* observed when utilizing RRMST. Data collection showed LT exhibited a higher standard error of frequency of diseased proportion over RRMST indicating those data had a higher variability. RRMST indicated a higher average proportion of diseased coral for most species and found more diseased *Siderastrea radians* individuals than the LT method. This pilot study was the first step in the validation of RRMST. The results of this study suggested an improved likelihood of locating healthy and diseased coral when applying RRMST. In future studies, researchers should standardize the depth and distance between the two protocols to help further validate the RRMST.

**025.218 U Preference of *Ctenogobius boleosoma* on habitats with and without sea grasses**, Roberto Cesar Robles, Saint Edwards University

Global warming reveals that rising sea levels can negatively affect aquatic grass beds and cause fish populations to migrate to new environments. This, in turn, can confuse and add stress to aquatic life by exposing prey fish to different predators and other antagonisms. Habitat preferences reveal trends in aquatic biodiversity as well as behaviors in both predatory and prey fish. Aquatic organisms belonging to the Gobiidae (goby) family can be found in a variety of coastal environments, such as oyster beds and a number of different grass beds. Therefore, the purpose of this study is to investigate how goby fish (*Ctenogobius boleosoma*) select different habitats; namely habitats with and without vegetation. Thus, studying the habitat preference of these fish can help the scientific community be better equipped to predict future trends in biodiversity and decide which kinds of habitats will be vital to preserve. Because the gobies used for this study were found in heavily vegetated environments, it was hypothesized that they would prefer the habitat with vegetation. Each goby was individually presented with two different habitats to select, one with vegetation and one without. After a twenty-four hour period the habitat preference was measured. A one-way ANOVA and a Chi Square statistic were used to analyze the data. Results of the analysis indicate a preference towards habitats containing vegetation, but the significance is marginal. Further testing of habitat selection will investigate the abundance of the vegetation as well as diversity of different sea grasses present.

**025.219 U Sea Fun Abundance and Frequency of *Millepora alcicornis* on the Mesoamerican Barrier**

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**Reef in Roatan Honduras**, *Shirley Rose Stewart, Mclennan Community College*  
Millepora spp., Sea Fans, Sea Rods, and Sea plumes make-up an abundant part of the Mesoamerican Barrier Reef system in Roatan, Honduras. Recent studies (Ruiz-Ramos et al. 2014; Goldberg 2013; Anderson 2015; Lewis 2006; Sanchez 2014) suggest that fire coral tend to parasitize octocorals and over take a majority of the reef. This study was conducted to assess the parasitism of Millepora alcicornis on Gorgonia ventalina off the Mesoamerican Barrier Reef in comparison to other studies in the Caribbean. This study was conducted off the coast of Roatan, Honduras from May 15, 2017 through May 19, 2017. The Randell - Robertson Marine Survey Technique was used to observe and record sea fans, sea rods, and sea plums starting at forty feet and ending at fifteen feet. Data was recorded for healthy sea fans, or sea fans with lesions, purpling, necrosis, or parasitizing Millepora. If Millepora was present the height of the soft coral would be recorded, along with the distance to nearby fire coral. The Kruskal- Wallis Rank Sum Test was used to statistically analyze the collected data, which was followed up by Dunn's Post Hoc Test to analyze the health status of the coral forms. Through observation and data collection Millepora spp. were more frequently associated with Caribbean Sea Fan than the sea rod or plume. Statistical analysis suggest that Millepora parasitized healthy sea fans compared to sea fans with lesions, purpling, or necrosis.

**025.220 H Water quality of the tidal Arroyo Colorado of Texas along a salinity gradient.**, *Paulina Ocadiz, International Baccalaureate Program at Lamar Academy; Paulina Sanchez, The International Baccalaureate Program at Lamar Academy; Jessica Ayala, The International Baccalaureate Program at Lamar Academy; Alison McClellan, The International Baccalaureate Program at Lamar Academy; Alejandro Vasquez, International Baccalaureate Program at Lamar Academy; Nicholas VanHee, The International Baccalaureate Program at Lamar Academy; Hudson DeYoe, The University of Texas Rio Grande Valley; Joseph Lawrence Kowalski, The University of Texas Rio Grande Valley*

The tidal section of the Arroyo Colorado (AC) is a mesohaline stormwater, agricultural and municipal drain that empties into the Laguna Madre. The AC, it is one of the most polluted bodies of water in the state of Texas. Inorganic nutrients and fecal bacteria exceed environmental thresholds. This can lead to algal blooms, diminished light levels, oxygen deficiency and increased rates of respiration. Salinity can diminish some pollution effects. We investigated a possible relationship between salinity and water column inorganic nutrients (nitrate, ammonium, and phosphate), underwater light, dissolved oxygen and partial CO<sub>2</sub> (pCO<sub>2</sub>)<sub>2</sub> at four sites along a salinity gradient. Nitrate concentrations were undetectable

farthest upstream but decreased at sites closet to the mouth of the AC. Ammonium and phosphate at the site farthest upstream were substantially higher than all other downstream sites. Underwater light was highly variable and the percentage of underwater light decreased from upstream to downstream in the AC, with greatest percent irradiance at the mouth of the AC. There was a clear decreasing trend in DO from upstream to downstream. We used pCO<sub>2</sub> concentrations as a proxy for respiration. pCO<sub>2</sub> at the sites farthest upstream were nearly identical and dropped significantly before the mouth of the AC and significantly rose again at the mouth. The pCO<sub>2</sub> concentrations at the AC Mouth were almost the same as upstream AC values. AC water was strongly colored and suggests bloom conditions. If photosynthetic rates were high, they could have been overwhelmed by substantially greater respiration rates.

Systematics and Evolutionary Biology

Systematics & Evolutionary Biology Poster Session  
Participants:

**025.221 N Development of new nuclear markers for phylogeny reconstruction in *Thomasomys* (Rodentia: Cricetidae)**, *Joshua M. Brokaw, Abilene Christian University; Hannah Seah, Abilene Christian University; John P Placide, Abilene Christian University; Meagan R. Benson, Abilene Christian University; Jonathan G. Jasper, Abilene Christian University*  
*Thomasomys* is a genus of mouse-like rodent species distributed primarily in northwestern South America. Previous investigations based on mitochondrial genes have provided well resolved nodes at the species level. In contrast, most deep nodes needed for reconstructing evolutionary adaptations in the geographic and ecological history of *Thomasomys* had short branches and low bootstrap values, suggesting a rapid radiation early in the diversification of *Thomasomys*. In order to further test these phylogenetic hypotheses, we have tested and designed primers in order to obtain sequences exon 6 of the gene coding for the dentin matrix (DMP1), first exon of the interphotoreceptor retinoid binding protein (IRBP), second intron of alcohol dehydrogenase gene 1 (Adh), seventh intron of b-fibrinogen gene (bfbg), and second intron of preproinsulin 1 (Ins). Early results suggest that these markers are less variable than previously used mitochondrial markers and the nuclear recombination activating gene 1 (RAG1) but could contain significant amounts of phylogenetically informative characters. Although increased phylogenetic resolution has been minimal, when combined, these nuclear gene can provided independent evidence supporting mitochondrially based hypotheses.

**025.222 U Examination of Virgin/Non-Virgin *Gambusia affinis* mating latency in a crossed experiment.**, *Samuel Kenyon, St Edward's University; Raelynn Deaton Haynes, St. Edward's University*

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*Gambusia affinis*, or the western mosquitofish, is a widespread invasive species prevalent across the globe due to human introduction. *Gambusia affinis* operate a coercive mating system with females able to retain sperm from multiple males. *Gambusia affinis* males should prefer mating with virgin *Gambusia affinis* females, as it provides a larger chance of their genes being passed on than if they mated with non-virgin females, who have already mated with other males and may have retained sperm from them. The examination of coercive mating systems with virgin/non-virgin *Gambusia affinis* individuals can shed light on the mechanisms of this species' mating preferences, and the possible advantages or disadvantages of either sex being virgin/non-virgin during mating attempts. In a crossed experiment using virgin/non-virgin male and female *Gambusia affinis*, latency time until attempts to mate occurred were recorded, along with mating behaviors and their frequency. The mating behaviours recorded were gonopodial displays and gonopodial thrusts. An acclimation time of five minutes and trial time of fifteen minutes were used, and a total of forty trials were run. The data collected was run through a two-way ANOVA test, first with and then without covariates. Statistical difference was found in two behaviours, mating latency times and gonopodial thrusts. Results suggest that non-virgin females are selected over virgin females by males, both in overall mating attempts and latency time.

025.223 U **Morphological and behavioral predictors of male dominance in *Gambusia affinis***, Ciara Crochet, St Edward's University; Dylan J Wichman, St. Edward's University; Raelynn Deaton Haynes, St. Edward's University

Dominance hierarchies typically develop in social organisms with competitive mating systems where resources are limiting. Facilitating cohabitation in these systems involves antagonistic interactions, such as physical aggression which can be costly. *Gambusia affinis*, commonly known as the western mosquitofish, exhibits dominance hierarchies and sexual dimorphism in that the males have a gonopodium rather than bright coloration. The gonopodium is a sex organ that is used to transfer sperm to females. Theoretically, males form dominance hierarchies that are based on aggressive behaviors and relative body size in this species. We are interested in how the particular morphologies contribute to dominance rank. We tested behavioral and morphological characteristics in male *G. affinis* that may contribute to dominance when multiple competing males are present. More specifically, we measured gonopodial thrusts and displays, and pigmentation changes. We predicted that dominant males would have darker body pigmentation, including the tear-drop pigment around the eye, and a longer gonopodium. We grouped similar sized males into sets of 5 (33 groups), marked each with one of five marks with fin clips (including "no mark"), and acclimated them for 24

hours before beginning trials. We observed male interactions with and without a female present by noting thrusts, displays, and pigmentation changes across 5 days. We currently are in the process of analyzing data, and will use regression analyses to determine if dominant males exhibit more body pigmentation and longer gonopodia. These findings will contribute to the body of literature on evolution and systems in freshwater species.

025.224 U **Preliminary insect biodiversity survey of Rolling N LLP properties, Runnels County, Texas**, Alyssa Brooks, Hardin Simmons University; Alexis Skiles, Hardin-Simmons University; Andrea B. Jensen, Hardin Simmons University

Biodiversity studies examine the variability among living organisms within an area. Understanding the relationship between biodiversity and ecosystem function provides valuable information which can impact land management strategies. In this study, a preliminary biodiversity survey of insects was conducted on a ranch in Runnels County. Portions of the ranch are involved in a native grass restoration project. Other portions of the ranch consist of cultivated pasture land and uncultivated, mixed vegetation areas with cyclic cattle grazing. A survey of insect biodiversity in Runnels County provides needed information about species variety in an area where the Rolling Plains, the Cross Timbers, and the Edwards Plateau converge.

025.225 U **Quantifying *Wolbachia* infection rates in Monarch and Queen Butterflies**, Kendall Wermin, Abilene Christian University; Christian Williams, Abilene Christian University; Rebecca - Hunter, Abilene Christian University

Monarch (*Danaus plexippus*) and queen (*D. gilippus*) butterflies are common, ecologically important components of terrestrial ecosystems throughout North America. Monarchs are of special interest due to their annual long-distance migration from the US to overwintering grounds in Mexico. Recent data suggest a decline in monarchs, possibly linked to a decrease in their food supply, loss of overwintering habitat and/or bacterial infection. Maternally-inherited male-killing bacteria infect many insect species, and are known to infect monarchs in the eastern US. The effect of these male-killing parasites on the health and structure of local butterfly populations is unknown. The purpose of this study was to screen for the maternally-inherited male-killing bacteria *Wolbachia* in local monarch and queen butterfly populations. During 2014 and 2015, 203 butterfly specimens were collected from around the campus of Abilene Christian University in Abilene, TX. Sex ratios and basic ecological information were recorded. PCR amplification using *Wolbachia*-specific primers was used to screen for the presence of these parasites in butterfly tissue. PCR products were checked using gel electrophoresis with a size standard

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to ensure that amplified products matched the expected size, and representative samples were verified with DNA sequencing. Thus far, DNA has been extracted from around 140 butterflies, and *Wolbachia*-specific primers have amplified *Wolbachia* from three butterflies. One of these samples has been sequenced which positively confirmed its identify as *Wolbachia*. This is a low occurrence of *Wolbachia*, but matches what has been reported in other studies. Once we have DNA sequences for all positive samples, we will compare DNA sequences to determine which *Wolbachia* lineages are infecting monarch and queen butterflies.

Chemistry and Biochemistry

Chemistry & Biochemistry Poster Session

Participants:

025.226 U **Analysis of mineral ion content of potable water from the natural springs of maniton springs, colorado using inductively coupled plasma-mass spectroscopy**, *Gilberto Gonzalez, University of The Incarnate Word; Abraham A. Williams, University of The Incarnate Word; Jason Gerding, University of The Incarnate Word; Alakananda R. Chaudhuri, University of The Incarnate Word; Edward E. Gonzalez, University of The Incarnate Word*

This study was undertaken to determine the mineral ion content of potable drinking water obtained from the natural springs of Manitou Springs, Colorado. The EPA has set federal standards of the amount of pollutants and metal ions allowed for safety in surface, potable and recreational waters. Water samples were collected in 500 mL polystyrene bottles from four of the eight natural springs that are located in the downtown area of the town and within walking distance of each other. The Mineral Springs Foundation of Manitou Springs has given names to all of the natural spring locations for reference. The four sites of natural springs selected for study were: (1) Cheyenne Spring, (2) Shoshone Spring, (3) Stratton Spring, and (4) Navajo Spring. The water samples were preserved with (1 + 1) nitric acid, and filtered in the lab through a 0.45  $\mu\text{m}$  filter. Three of the samples were very clear of turbidity and did not require digestion with the exception of one. That particular water sample (100 mL) was digested with concentrated nitric acid by gentle refluxing in a hot water bath following EPA method 200.8. The spring water samples were analyzed for twenty-seven metals by ICP-MS using a Varian 820-MS model and the outcomes compared both qualitatively and quantitatively. Our study showed that all of the mineral ion concentration levels of the four samples fell within the regulated limits of safety for human consumption by the EPA and the State of Texas Commission on Environmental Quality.

025.227 U **A new silicon-metal complex that reveals unknown phosphine-metal chemistry**, *Deidrah Carrillo, University of Texas at El Paso; Renzo Arias,*

*University of Texas at El Paso; Alejandro Metta-Magaña, The University of Texas at El Paso; Hemant K. Sharma, The University of Texas at El Paso; Keith Pannell, University of Texas at El Paso*

The synthesis, characterization, and electrochemistry of  $\{\eta^6\text{-}(\text{Organosilyl})\text{arene}\}\text{chromium tricarbonyl}$  complexes have been previously recorded (Moran, 1992), but the reactivity with other compounds are yet to be discovered. The chemistry of  $[\{(\text{CO})_3\text{Cr}\}\eta^6\text{-C}_6\text{H}_5\text{SiMe}_2\text{H}$  (1) is being investigated. In specific, the oxidative addition/reduction elimination reaction with  $(\eta^5\text{-C}_5\text{H}_5)\text{Fe}(\text{CO})_2\text{Me}$  (2) to form a silicon-bimetallic complex. By irradiating 1 and 2, the expected product of  $[\{(\text{CO})_3\text{Cr}\}\eta^6\text{-C}_6\text{H}_5\text{SiMe}_2\text{-Fe}(\text{CO})_2(\eta^5\text{-C}_5\text{H}_5)$  (3) is produced, which has been characterized by multinuclear NMR and single crystal X-ray diffraction. The reductive/oxidative properties of the metal centers of 3 are further investigated by the irradiation in the presence of triphenylphosphine (Ph<sub>3</sub>P) where both metals in the intramolecular system are exposed this then unveils a unique chemical transformation. Moran, M; Cuadrado, I; Pascual, M. C.; Cassado, C. M. Organometallics 1992, 11, 1210-1220

025.228 U **Beta-2-microglobulin mutations**, *Mikayla Rose Gascich, Austin College*

Beta-2-microglobulin (B2M) is a 99 residue protein that is a part of the Class I Major Histocompatibility Complex (MHC). The protein is characterized by a 7-stranded B sandwich stabilized by a single disulfide bond. B2M misfolds to aggregate into amyloid fibrils which has been linked to the disease Dialysis Related Amyloidosis (DRA). To investigate the misfolding process  $\beta$ 2M will be mutated at different locations of the protein to test their effect on how the protein folds normally and how it misfolds. There are a lot of mutations that have been seen to cause big differences in the lag and elongation of the protein at or around position 60 such as position 58, 60, and 65. The lag and elongation time of protein folding has been directly tied to the formation of amyloid fibrils. The lag and elongation are two stages of the protein misfolding process. Where lag is a measure of the amount of time it takes in order to initiate the misfolding event and the elongation is the rate of propagation. There are also some interesting positions found towards the end of the protein that have major effects of the lag and elongation of the protein. Position 82 is one such position. By changing specific amino acids in specific places in the protein, valuable information will be obtained on how misfolding is occurring. Mutations were made through the process of Quick Change PCR, PCR purification, transformation, and QIAPrep. The mutations were then confirmed with DNA sequencing.

025.229 U **Characterization of Texas home distilled alcohol using gas chromatography and flame atomic absorption spectroscopy.**, *Linh Pham, Texas A&M University - Central Texas; Randy Alan Stoneroad II,*

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*Texas A&M Central Texas; John Grady Barber, Texas A&M University Central Texas; Coady Lapierre, Texas A&M University - Central Texas*

Contamination of twenty home distilled alcohol samples collected in Texas were analyzed utilizing Gas Chromatography (GC) and Flame Atomic Absorption Spectroscopy (FAAS). The trace content of heavy metals, copper and lead, was determined by FAAS; and the percent by volume of ethanol and volatile impurities was characterized using GC. Results were compared to OSHA and CDC standards for both incidental and chronic exposure. These findings provide a quantitative basis for determination of potential health risks due to consumption of home distilled alcohol in Texas.

**025.230 U Chemical signaling in the phycosphere: Growth response of Chromists to bacterial signals and Phytohormones**, *Daniela Hirsch, University of the Incarnate Word; BD Leverett, University of the Incarnate Word*

Plants and algae contain multiple chemical and physical mechanisms to overcome biotic and abiotic stressors in their environment, such as changes in salinity, temperature, and in the constituencies of their microbiota. Algae adapt to environmental and population dynamics through the production of and response to allelochemical signals, called semiochemicals, which are disseminated into the immediate surroundings of the algal cell, its phycosphere, by the algae and by other microorganisms. A number of studies have investigated signaling dynamics in robust green microalgae and diatoms, but few reports have examined growth and pigmentation responses in species from the kingdom of Chromista. In these experiments, a group of colorful Chromists have been grown in a multi-well plate format to study the differences in growth rate and pigmentation observed in the presence of select phytohormones and bacterial signals. Cell viability and pigmentation in microalgal cultures were evaluated using flow cytometry. Signal degradation in live cultures and by crude microalgal extracts were examined in signaling assays and by C18HPLC. The Eustigmatophytes, *Eustigmatos vischeri* and *Nannochloropsis oculata*, showed decreased growth in the presence of some bacterial signals, but degraded other signals as crude extracts and in live culture. The golden algae, *Tisochrysis lutea*, demonstrated small but detectable growth increases in the presence of each of the phytohormones tested. Crude extracts from each of the marine Chromists, *Phaeodactylum tricoratum* and *Rhodomonas salina*, showed limited degradation of bacterial signals. Slight differences in the growth rate of xenic microalgal cultures versus the axenic cultures were also observed.

**025.231 U Construction of peptide-based molecular building blocks for the controlled assembly of nanomaterials**, *Jessica Bird, University of Texas at*

*Tyler; Dustin Patterson, The University of Texas at Tyler; Sean C Butler, The University of Texas at Tyler*  
A major challenge in the construction of nanomaterials is synthesizing materials with well defined, homogeneous structures. However nature shows the innate ability to construct diverse bio-nanomaterials through the non-covalent self-assembly of proteins, often yielding homogenous structures that are arranged at the molecular level. Self-assembly of proteins is driven by non-covalent association of short peptide sequences or small molecular surfaces through complementary molecular interactions. Inspired by the bio-specificity of protein/peptide driven assembly, the research presented investigates the use of peptides to construct molecular building blocks (MBB) that provide step-by-step, MBB-by-MBB, control over the bottom up self-assembly of nanostructures. The strategy looks at exploiting coiled coil forming peptide sequences to construct MBBs 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 for their construction and assembly.

**025.232 U Design of laboratory experiences in material science for cooperative project-based experimentation in General Chemistry**, *Corbin McCleary, Sam Houston State University; Adrian Villalta-Cerdas, Sam Houston State University*  
General chemistry laboratory programs are tasked with developing a better understanding of chemistry content knowledge and practical skills in experimental chemistry. To achieve the task, many laboratory experiments are one-week-long experiences that are unrelated and required different chemistry concepts, studied via different laboratory techniques. Thus students often fail to realize the interconnection between chemistry concepts, laboratory techniques, and the curriculum design of their learning experience. The work presented herein comes to design laboratory experiences that foster clear connections between laboratory experiments, covering fundamental concepts in chemistry (e.g., density, heat exchange, calorimetry, the rate of cooling). In these laboratories, collected data during one experiment is fundamental to support future analyses. Thus the design implicitly guides students into developing an overarching comprehension of the chemical phenomenon being studied. The laboratory experiments focused on materials that are robust (e.g., thermally stable, durable) and provide reproducible data (e.g., density, heat capacity, cooling curves), making the process of investigation feasible within the timeframe of the laboratory. For example, one of the designed laboratories utilizes copper alloys with three metals (i.e., Sn, Zn, Al) of varying composition to

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understand the factors that affect the cooling of the metal alloys. To complete the laboratory experience, students need to collect data from many samples and shared their collective results for all the class to compile and interpret. Examples of procedures, data, and results will be presented and discussed in light of their design and implementation for the General Chemistry laboratory program at Sam Houston State University.

**025.233 U Difference of tRNA gene distribution between three low-GC bacteria**, *Gracia Sebastiao, Wayland Baptist University; Robert L Moore, Wayland Baptist University*

*Clostridia* genomes have relatively low GC%, but contain regions with high local GC content. Using NCBI, the highest local GC regions in *Clostridium botulinum* and *Clostridium novyi* were determined to contain multiple tRNA genes. For comparison *Mycobacterium leprae*, which has nearly identical overall GC% to these *Clostridia* but lacks regions of high local GC%, has tRNA genes with the same GC content as the *Clostridia*. When defining bundling as two genes within 100 base pairs of each other, *C. botulinum* had 78% of the tRNA genes contained in 12 bundles with an average 5 genes per bundle and largest bundle of 22 genes, *C. novyi* had 78% in 11 bundles with an average of 6 genes per bundle and largest bundle containing 21 genes, and *M. leprae* had 27% bundled into 5 bundles of which none had more than 3 tRNA genes. The question that remains is what physiological benefit is gained by the *Clostridia* bundling the tRNA genes to give such large local GC% compared to the organismal total GC% while *M. leprae* keeps the tRNA genes distributed.

**025.234 U Effect of *Trichoderma viride* volatile organic compounds on growth inhibition and protein synthesis in *Neolentinus lepideus***, *Elizabeth Nguyen, St. Edward's University; Mary A. Kopecki-Fjetland, Ph.D, St. Edward's University*  
*Trichoderma viride*, a competitive soil fungus, inhibits the growth of wood decaying fungi such as *Neolentinus lepideus* via production of volatile organic compounds. This interaction has the potential to serve as an alternative to chemical treatment of fungal wood infections. The literature also reports that fungal VOCs can cause a decrease in the synthesis of specific proteins. This study focuses on further elucidating the impact of VOCs on *N. lepideus* growth inhibition and protein synthesis thus enhancing our understanding of their potential biocontrol nature. Results show that *N. lepideus* grown in the presence of *T. viride* exhibited greater inhibition the longer it was exposed with the largest gain in inhibition occurring after four days of exposure. In order to test the degree of inhibition by specific VOCs, *N. lepideus* was grown in the presence of various concentrations of either octanal or 2-methyl-1-butanol. Interestingly, preliminary results indicate

greatest inhibition of *N. lepideus* occurred at the highest concentrations of octanal, but at the lowest concentrations of 2-methyl-1-butanol. The protein purification method was improved at two key steps yielding significantly larger amounts of total protein. *N. lepideus* proteins isolated from samples grown in the presence of *T. viride* or specific VOCs were separated using SDS-PAGE and visualized with Coomassie blue. This staining method proved too insensitive to identify any variations in protein production. Future work includes visualization of protein patterns utilizing a more sensitive silver staining method and further examination of the impact of additional individual VOCs on fungal growth.

**025.235 G Extraction and antimicrobial activity in three classes of microalgae**, *Patrick Matulich, University of the Incarnate Word; BD Leverett, University of the Incarnate Word*

Biofilms are extracellular matrices produced by bacteria for adhesion and are a major factor in cell to cell gene transfer and the development of antimicrobial drug resistance (AMDR). AMDR is becoming a more prevalent and life-threatening feature of human infections, especially in hospital settings. Extracts of both marine and freshwater microalgae have been shown to have antimicrobial effects, including some activity of against bacterial biofilms. This study examines antimicrobial activity two types of lipid extracts from select species of freshwater and marine algae. Assays for bacterial biofilm formation, bacterial biofilm viability, and bacterial growth, have been performed according to established methods. Biofilms established by the gram negative pathogen, *Stenotrophomonas maltophilia*, were stained with crystal violet stain and with the tetrazolium dye, MTT, after incubation with and without the presence of algal extract to determine the impact of extracts on biofilm formation and cell viability within biofilms. Antibiotic sensitivity in planktonic cultures of *S. maltophilia* was assessed with and without the presence of algal extracts according to established in vitro methods as a means of examining whether algal extracts increase sensitivity of *S. maltophilia* cultures to common antibiotics. Preliminary results demonstrate enhanced sensitivity of *Stenotrophomonas maltophilia* biofilms to rifampin, penicillin, streptomycin, and gentamycin in the presence of microalgal extracts. The extracts did not exhibit a significant impact on drug sensitivity in planktonic cultures of *S. maltophilia*, as demonstrated by the minimum inhibitory concentrations (MICs) of select antibiotics with and without extracts present.

**025.236 U Gold (I) Catalyzed Synthesis of 1H-Isochromenes**, *Saarah Cantu, Southwestern University*  
1H-Isochromene derivatives are found in a variety of biologically active molecules and are therefore of interest to the pharmaceutical industry. These organic moieties have been successfully synthesized using a



novel gold(I)-catalyzed cyclization. This reaction affords 1H-isochromenes in a 41% unoptimized yield from simple benzylic alcohols. This methodology has been applied to the implementation of a gold-cleavable alcohol protecting group that generates a similar 1H-isochromene as a byproduct. The cyclization regenerates the alcohol with an 80% yield.

**025.237 U Green synthesis of a cross-linked polymerized hydrogel containing NDHGA-capped gold nanoparticles**, *Elizabeth O Rugutt, University of Texas of the Permian Basin; Milka O Montes, University of Texas Permian Basin*  
Masoprocil, also known as nordihydroguaiaretic acid is an antineoplastic drug is that inhibits skin growths and holds anti-inflammatory properties. Currently, methods for the development of skin treatment drugs that are ecofriendly, low cost, convenient and sustainable are imperative as the demand for such treatment increases. In this work, the aim is to describe the synthesis of a cross-linked gold nanoparticle-polymer network, in the form of a protective hydrogel containing nordihydroguaiaretic acid extracted from the plant *Larrea tridentata*. The hydrogel was prepared via polymerization of acrylamide, polyethylene glycol dimethacrylate, poly vinyl alcohol, and Lithium-phenyl-2,4,6-trimethylbenzoylphosphinate. Nordihydroguaiaretic acid capped gold nanoparticles were synthesized and incorporated into the hydrogel to produce a wound dressing. The results demonstrate that metallic gold nanoparticles can readily integrate into a cross-linked polymer and function as a drug delivery system for the topical treatment of skin lesions.

**025.238 G Hydrogenation of CO<sub>2</sub> using bifunctional transition metal catalysts containing hydride-relay ligands**, *Nilakshi Devi, Ms.; Christopher M Zall, Dr.*  
Development of efficient homogeneous catalysts for the hydrogenation of CO<sub>2</sub> to carbon-based fuels and feedstock that operate at low temperature and pressure is the primary goal of this research. The catalysts used are bifunctional transition metal complexes that contain organic groups capable of accepting or donating hydride ions which we term as "hydride-relays". The relay is tethered to a phosphine donor that can bind to a metal center. The metal and relay can thus work cooperatively to activate H<sub>2</sub> forming an acidic M-H bond and a ligand based C-H bond, and then reduce a metal-bound substrate like CO<sub>2</sub> through hydride and proton transfer. These hydride relays are designed to minimize kinetic and thermodynamic barriers for H<sub>2</sub> activation and substrate reduction. To achieve this design, a series of these complexes has been synthesized and characterized based on a simple and modular synthetic framework, in which a series of organic hydride donors, namely phenanthridinium and substituted benzimidazolium groups, are tethered to a phosphine donor. The synthesis of transition metal complexes in which these ligands are combined with

phosphine complexes of Ni, Pd, Rh and Ru, will be presented, as well as catalytic hydrogenation activity of these complexes towards CO<sub>2</sub>.

**025.239 U Investigation of acetylation of  $\beta$ -2 microglobulin to trigger misfolding**, *Robbie Moore, Austin College*

$\beta$ -2 Microglobulin (B2M) is a component of the class 1 major histocompatibility complex molecule which is an integral component of the immune system. When B2M misfolds it forms an amyloid fibril, which leads to the chronic disease dialysis related amyloidosis. It is still a mystery what initially triggers misfolding of this protein in the human body. However, in a separate study it was shown that changing the net charge of a protein will affect its ability to self-assemble into aggregates by optimizing the repulsive intermolecular interactions electrostatically. Conversely, the change in the net charge of a protein could also induce the self-assembly of aggregates by reducing electrostatic repulsion. Acetylation was used to introduce a change in the net charge to test the hypothesis that reducing the net charge will increase the rate of amyloid formation. A common acetylating agent that is used in everyday life is aspirin. Acetic anhydride, a slightly stronger acetylating agent, was chosen to be used. Purified B2M was taken and reacted it with the acetic anhydride and analyzed it using SDS- Page gel. From the gel we could see that the acetic anhydride caused splitting in the bands of the gel. This does not confirm acetylation of the protein, however it does tells us that acetic there is a chemical change occurring in the B2M which warrants further investigation.

**025.240 U Isolation of visible and fluorescent dyes from red cabbage for new applications**, *Eric Yang, Member of the Texas Academy of Science; Thomas Edward Ready, Midland College*

It has been widely known for over a century that the dye from red cabbage, which is ubiquitous in red cabbage juice, behaves as a universal pH indicator. The possibilities of using this material as a (non-hydronium) ion-specific colorimetric sensor are investigated. The first step in this process is the isolation and characterization of visible and/or fluorescent dyes from the plant.

**025.241 G Lanthanide and actinide extractions using di(p-tert-butylphenyl)-N,N-di-(isobutyl)carbamoymethylphosphine oxide substituted acetic acid**, *Raul Alejandro Cuevas, Student; Keith Pannell, University of Texas at El Paso*  
Liquid-liquid extraction of lanthanides (La, Nd, Eu, Dy and Yb) and some actinides (Th and U) has been investigated using di(p-tert-butylphenyl)-N,N-di-(isobutyl)carbamoymethylphosphine oxide (CMPO), and a new CMPO modified at the methylene position with an addition of an acetic acid group. The complex formed by the metal ion and the CMPO was characterized by NMR spectroscopy, <sup>31</sup>P, <sup>13</sup>C, <sup>1</sup>H, and

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single crystal X-ray diffraction. The extraction efficiencies were deducted after mixing the two solutions with equal concentration of ligand and metal, in their respective phases, for 4 hours and analyzing metal content, in the organic phase. Using metal concentrations, distribution ratios of the extractions were calculated and compared to determine the efficiency of these ligands and, more importantly, the impact of the carboxylic acid functionality on this important extraction process.

**025.242 U Modifying the HK97 virus-Like particle as a cargo delivery and protection system**, *Michael King, University of Texas at Tyler; Dustin Patterson, The 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 VLP derived from the HK97 bacteriophage is a unique VLP; it self assembles from 420 copies of a single coat protein into a 60 nm spherical particle that forms a catanene structure, whereby the coat protein monomers become covalently cross-linked during its maturation process forming the molecular equivalent of protein chain mail. This ability to form a structure with all components covalently cross-linked gives the capsid inherent stability that can be exploited to construct robust nanomaterials. The research presented will discuss our recent findings in the development of the HK97 VLP, which focuses on the encapsulation of foreign protein cargos and synthetic compounds on the VLP interior.

**025.243 U Phenolic composition and essential oil contents of 23 basil (*Ocimum basilicum* L.) cultivars**, *Melanie S. Aing, Southwestern University; Eunice M. Bajomo, Southwestern University; Lucas S. Ford, Southwestern University; Emily Niemeyer, Southwestern University*

Basil (*Ocimum basilicum* L.) is an aromatic herb widely used in cooking that also has applications in traditional medicine for the treatment of headaches, coughs, diarrhea, and constipation. Basil contains numerous phenolic compounds with known antioxidant properties which may confer a range of human health benefits. These phenolic antioxidants are able to act as reducing agents in the body to prevent harm caused by oxidative stress. The purpose of this study was to analyze commercially available basil cultivars to identify the types of basil with the highest phenolic and essential oil contents. Replicates of 23 basil cultivars (n = 105 total plants) were grown from seed in a greenhouse for 55 days. Total phenolic concentrations of the cultivars

were measured using the Folin-Ciocalteu method, and essential oil content was determined using a solid-phase microextraction (SPME) gas chromatography/mass spectrometry (GC/MS) technique. This presentation will discuss similarities and differences in phenolic composition and essential oil content among these basil cultivars.

**025.244 U Photolytic cleavage of N-acyl-7-nitroindolines on nanoparticles and in metal organic frameworks**, *Karen Liliana Castaneda, University of Texas El Paso*

The photolytic cleavage of N-acyl-7-nitroindolines in solution is well known, but their behavior on solid surfaces is much less studied. For the first time the immobilization of a cysteine-5-bromo-7-nitroindoline derivative to the surface of gold nanorods, and the subsequent photorelease of 5-bromo-7-nitroindoline into the solution triggered by UV light is observed. This system could potentially be useful for the controlled light-induced delivery of compounds by a photo-release mechanism in living cells. We also demonstrate that N-acetyl-5-bromo-7-nitroindoline can be non-covalently absorbed by metal organic frameworks (MOFs), and photolytically cleaved inside of the MOF's cavities. This photochemistry allows the study of host-guest chemistry in MOFs. The synthesis and characterization of the photoreactive compounds, nano rods, and the MOFs used in this study will also be presented.

**025.245 U Preventing photobleaching in Cy5-alkyne systems**, *Ian Orantes-Orellana, Southwestern University; Dr. David Cooper, Southwestern University; Mauro A. Garcia, Southwestern University; Lauren Gillespie, Southwestern University*

Fluorescent dyes are an integral part of many biological techniques, such as cell membrane probes and receptor-targeted tracers. However, fluorescent dyes are susceptible to the permanent loss of fluorescence, when excited electrons enter the triplet state and undergo reactions. This photobleaching effect has important consequences for long-exposure fluorescent imaging as these effects can lead to the loss of fluorescence intensity. To combat this effect, photoprotection systems can be used. One such system is the reducing and oxidizing system (ROXS), which provides a separate pathway for electrons to exit the excited triplet state quickly, reducing the chance of these electrons being scavenged. Previous research indicates ROXS significantly improve the fluorescent lifetime of the Cy5-Alkyne dye on a single molecule level. This research aims to push these results further and create a technique to select promising photoprotection pathways on a macro scale to create a screening process for other photoprotection systems. This work varies the concentration of Cy5-Alkyne dye and ROXS solution to detect a significant increase in photoprotection across concentrations. The results show that increasing the concentration of ROXS to dye significantly increases

the photoprotection effect.

**025.246 U Sequential encapsulation of enzymes within the P22 virus-like particles indicates maturation of an enzyme is important to obtaining optimal kinetic activity**, *Christy Hjorth, The University of Texas at Tyler; Dustin Patterson, The University of Texas at Tyler*

Encapsulation of enzymes into protein cage structures holds promise for better understanding of enzyme function in cellular environments by mimicking crowding conditions and for developing new catalytic nanomaterials. While encapsulation inside protein cages has been shown to modulate enzymatic activity, it is unclear whether these changes in kinetic activity are due to crowding effects or the result of modified folding and maturation of the enzyme. The research presented here evaluates the enzymatic activity of formate dehydrogenase, from *Candida boidinii*, and alcohol dehydrogenase D, from *Pyrococcus furiosus*, when encapsulated inside protein cage virus-like particles (VLPs) derived from bacteriophage P22. Results from a rapid in vivo genetically programmed encapsulation strategy showed greatly reduced kinetic activity (*k<sub>cat</sub>*) upon protein expression. To examine whether these kinetic changes were the result of crowding effects or interference of the folding and/or maturation of the enzyme, a modified in vivo encapsulation strategy was implemented that enabled the enzyme to first be expressed, allowing folding and maturation, then encapsulated within the P22 VLP. Results suggest some enzymes may require maturation to their active conformation before encapsulation inside VLPs to obtain optimally active enzymes and that kinetic activity changes are not entirely the result of cellular crowding effects as previously assumed. The strategy and results reported highlight important considerations for the encapsulation of enzymes inside confined reaction environments towards the development of active functional nano-reactors.

**025.247 U Study of the effects of titanium dioxide nanoparticles in the nitrogen cycle of *Favites Pentagona* Coral environment**, *Melissa Wood, University of Texas of the Permian Basin; Milka O Montes, University of Texas Permian Basin*

Titanium presence in aquatic environments enters environmental compartments from different sources. Previous work has shown TiO<sub>2</sub> inhibits the nitrogen cycle when introduced to cyanobacteria and inhibits calciferous coral growth of mounding coral species. This work aims to study the effects of TiO<sub>2</sub> nanoparticles on *Favites Pentagona* Coral environment, by exposing a coral specimen to TiO<sub>2</sub> nanoparticles in seawater tanks. The water in TiO<sub>2</sub>-exposed coral showed a nitrate spike and the coral suffered a considerable decline in health. Moreover, there was also an evident change in the algal growth pattern when exposed to titanium dioxide. Preliminary results, show

nitrite concentrations of up to 10 ppm after 96 hours of exposure. Additionally, qualitative determination of titanium species in *Favites Pentagona* Coral tissues was achieved by scanning electron microscopy. A protocol for fixing live coral for SEM examination has been developed and tested with good results. Both the nitrate/nitrite quantification in seawater using UV/vis and titanium determination using scanning electron microscopy will be applicable to many subdisciplines in the marine science and marine chemistry fields.

**025.248 U Synthesis of 1,4-Diketones with Low-Valent Titanium Species**, *Nathan Le, Southwestern University*

A novel method for the formation of 1,4-diketones was developed using low-valent titanium species. The products of this novel methodology are industrially important precursors for the synthesis of bioactive compounds such as furans, pyrroles, and thiophenes. These heterocycles are commonly found in larger macrocycles such as heme, chlorins, chlorophyll, agrochemicals, and pharmaceuticals that function as biological inhibitors and DNA/RNA selective targeting reagents. The use of  $\alpha$ -bromoketones affords 1,4-diketone synthesis in up to 81% yield and the scope of this reaction has been expanded to a variety of bromoacetophenone derivatives. This work represents a unique and under-explored reactivity manifold for homogeneous low-valent titanium compounds and represents the first implementation of this novel intermediate to the synthesis of complex molecules.

**025.249 U Synthesis of small organic molecule for near-infrared lasers**, *Payton J Nelson, Schreiner University*

Near-infrared (NIR) lasers have proven to be useful and effective in fields such as bio-imaging, night vision devices, spectroscopy, and optical telecommunications. Typically NIR lasers made from Inorganic III-V semiconductors, like GaAs, have been quite successful, however, they have complex fabrication techniques and are very costly to make. Organic semiconductors have been a significant research subject partly because they are self-assembling and can be made in normal conditions. Here we designed and synthesized the small organic molecule developed from an aldol condensation between 1'-Hydroxy-2'-acetonephthone and 4-(Diphenylamino) benzaldehyde. Nuclear magnetic radiation (NMR) and thin layer chromatography (TLC) were used in determining the final product.

**025.250 U The reduction of gold nanoparticle formation by *Lactobacillus acidophilus***, *Ezequiel Paz, University of Texas of the Permian Basin; Milka O Montes, University of Texas Permian Basin*

The purpose of this research experiment is to determine the ability of *Lactobacillus acidophilus* to produce gold nanoparticles. Two different methods for the synthesis of the nanoparticles were used: extracellular synthesis and intracellular synthesis. The reason for the separate

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syntheses is to determine if bacterial metabolites or intracellular mechanisms, that bacteria use to neutralize the negative effects of gold ions, are used to synthesize the nanoparticles. It was concluded that the bacteria could produce particles that were around 0.2  $\mu\text{m}$  - 2  $\mu\text{m}$  in diameter both extracellularly and intracellularly, with intracellularly synthesized particles being more uniform and round and the extracellularly synthesized particles being more irregular in shape.

**025.251 U Using local GC percentage to detect unusual regions in bacterial genomes**, Sharon Leigh Ann DeMerritt, Wayland Baptist University; Gracia Sebastiao, Wayland Baptist University; Robert L Moore, Wayland Baptist University

Development of new antibiotics may include strategies such as identifying unique genes that may serve as an antibiotic target, or previously unidentified similarities between an antibiotic resistant organism and other organisms that have well-known treatments. As a new approach to find these features, we examined the genomes of 28 bacterial organisms at a "local" level to find regions that seemed dissimilar to the rest of the genome. Local GC percentages were defined as the percentage of guanine and cytosine across 210 base pairs, and these local GC percentages were calculated at 70 base pair intervals across the entire genomes of the organisms. Median and quartiles for the local GC percentages of all of the organisms were also determined. While most organisms' local GC percentages remained within a certain range, some organisms showed interesting characteristics where this was not the case. For example *Mycobacterium tuberculosis* had a much larger range than the other *Mycobacteria*, and the bacteria from the *Clostridium* genus had extreme spikes in GC percentage extending as much as 20% outside of its typical range. Some of these anomalous areas of the genome could be examined to identify potential sites of horizontal gene transfer or other unique features of an organism that may lead to new targets for antibiotic development.

**025.252 U Viability of API testing kit for ammonium measurement**, Sonal V Jha, University of Texas Rio Grande Valley

Monitoring ammonium levels is important in aquaculture. While plants are able to use ammonium for growth, very small quantities are toxic to a wide range of animals. Unfortunately, mainstream methods of testing ammonium are expensive and involve cumbersome equipment. The purpose of this experiment was to determine whether the inexpensive API ammonium testing kit, typically sold for hobbyists, is a viable option for testing ammonium concentration in water. A test was devised to measure the accuracy of color absorbance (675 and 700nm) at varying parts per million of ammonia and at varying time intervals of 2, 5, 7.5, 10, and 60 minutes after reagents were mixed. From 0 ppm to 16 ppm, absorbance at 700 nm follows a

strong linear relationship, with an R<sup>2</sup>-squared value of 0.9963. Above 16 ppm, the absorbance peak shifted from 700 nm to 675 nm. It was also found that the company instructions to allow 5 minutes to elapse before color measurement is an underestimate, and at least 7.5 minutes should pass before absorption is measured. The research found that the API ammonium testing kit is a viable option for measuring ammonium levels in water. The linear relationship given by absorbance peaks allows for accurate measurement of ammonium levels, the reagents used are stable in solution and can be used in the microliter range, allowing the kit to be used for many more tests. Thus, use of the API ammonium testing kit could decrease the cost of measuring ammonium levels in water substantially.

**025.253 U Virtual screening for novel inhibitors of Trypanosoma cruzi 6-phosphogluconate dehydrogenase**, Kaan Kumru, University of Texas at Austin

Chagas disease, caused by the protozoan parasite *Trypanosoma cruzi*, affects at least 8 million people in Latin America, with 30-40% of those infected developing cardiomyopathy or digestive megasyndromes in their life. Chagas is recognized by the World Health Organization (WHO) as one of 13 neglected tropical diseases, and those with Chagas often go untreated. Current treatments such as benznidazole or nifurtimox do not work well in treating the disease long-term and have significant side effects. In hopes of finding a more suitable and effective drug for the treatment of Chagas disease, virtual drug screening was carried out against the 6-phosphogluconate dehydrogenase (6PGDH) enzyme, an essential part of the pentose phosphate pathway. Structure-based in silico docking was performed on the Ti3D drug-discovery high-performance computer. Approximately 27,437 ligands from multiple ligand libraries were assessed against the TC6PGDH enzyme for their predicted binding potential using GOLD molecular docking software. A homology model was created by threading the protein sequence for *T. cruzi* 6PGDH through the crystal structure for *Trypanosoma brucei* 6PGDH (PDB: 1pgj) using ICM. The position of 6-phosphogluconate (6PG) and NADP<sup>+</sup> were inferred and used to define the active site of TC6PGDH. At least 10 ligands were found to score higher (87.91-92.21) than the native 6PG (33.16) ligand and follow Lipinski's rule of 5. In preparation for expression of the enzyme to test against the potential inhibitors found through virtual screening, the coding DNA sequence for TC6PGDH was cloned (putatively) into a PET expression vector for later metal-affinity purification (pNIC-Bsa4).

**027. Graduate Competition Oral Session 1**

1:30 to 3:00 pm

Carrasco Building, Lecture Room

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Graduate Student Paper Competition

Graduate Competition Oral Session 1

Participants:

- 1:30 027.254 G **Evaluating suitable habitat of invasive tilapia and forecasting hotspots for potential impacts on imperiled fishes of Texas**, *Elizabeth L Roesler, Texas Tech University; Monica McGarrity, Texas Parks and Wildlife Department; Matthew A Barnes, Texas Tech University*

Tilapia represent popular aquaculture fishes which have had considerable invasive success worldwide, facilitated by commercial escapes and bait-bucket introductions. We conducted a comprehensive literature review to evaluate tilapia research and research gaps, specifically related to invasive tilapia and potential impacts on fish species of greatest conservation need in Texas. Furthermore, we developed species distribution models in Maxent to predict the extent of suitable habitat of four focal invasive tilapia species: Blue Tilapia (*Oreochromis aureus*), Mozambique Tilapia (*O. mossambicus*), Nile Tilapia (*O. niloticus*) and Wami Tilapia (*O. urolepis*). These focal species are already present or have been previously documented in the wild in Texas, and are currently permitted for aquaculture and/or pond stocking, with the exception of *O. urolepis*. *Oreochromis urolepis* is commonly used in aquaculture in other states and sold online; therefore, introductions could potentially occur in Texas. Predictions of suitable habitat in Texas differed between species. Invasion success, in terms of area occupied, was predicted to be greatest for *O. aureus*, with a modeled distribution potential of almost the entirety of the state. Our combination of literature review and distribution modeling provides insights that may help to target future research and management of invasive tilapia in areas where most effective for evaluating and minimizing potential impacts to imperiled fishes.

- 1:45 027.255 G **Post-op bleeding in a patient with noonan syndrome and factor XIII deficiency: a case study**, *Tyler Jay Homewood, UNTHSC/TCOM*

We present a 13-year old boy with known Noonan syndrome who experienced profuse bleeding from the left ear and a large hematoma formation after an otologic procedure. Although Noonan patients are known to experience bleeding complications, our patient had undergone various surgical procedures without prior hemorrhagic events. Due to retained ear tubes and chronic suppurative otitis media, the patient developed conductive hearing loss and was recommended to receive surgical intervention. The patient presented the following day to the emergency department with bleeding from the left ear and hematoma of the left side of his face and neck. He was discharged after bleeding was stopped; but once home, the bleeding started again, and he was re-admitted for an exploratory exam under general anesthesia. Diffuse

oozing was discovered, and a platelet transfusion was provided to stop the bleeding. A bleeding disorder workup was sent including a factor XIII activity assay. Preliminary coagulation tests proved normal, however factor XIII deficiency was confirmed. This is the first described case of factor XIII deficiency presenting in a patient with Noonan syndrome. Noonan patients have a proclivity for bleeding diathesis, but much more commonly due to other factor and platelet abnormalities. Noonan syndrome is common enough that many clinicians and surgeons will see these patients in their practice. It is important to be aware of the common bleeding disorders associated with Noonan syndrome, but also to be aware that they can have other rare bleeding disorders despite normal basic coagulation tests.

- 2:00 027.256 G **Role of time in K9 narcotic training aids: Perspectives on working dog performance**, *Lauren Alejandro, Graduate Student; Paola Prada, TTU Research professor PhD.*

There has been little scientific research into the age of narcotic training aids in relation to K9 performance, even though they are a pivotal part of the training regimen. The purpose of this study was to instrumentally monitor target odor vapors emanating from real and pseudo K9 training aids based on age and document alert performance during K9 field testing. The odor evaluation process consisted of collaboration with the Lubbock Police Department (LPD), Canine Unit and use of their narcotic training aids that range in age of up to 10 years compared to fresh training aids. The study used four certified narcotic detection K9 teams for field testing purposes. Instrumental evaluation utilized

Divinylbenzene/Carbon/Polydimethylsiloxane (DVB/CAR/PDMS) coated Solid Phase-Microextraction (SPME) fibers that were injected into a Gas Chromatography-Mass Spectrometry (GC-MS) system for the identification of extracted narcotic headspace odor profiles of heroin and cocaine. The pseudo narcotic formulations were evaluated in a controlled laboratory setting ranging from a 2-12-week storage time. The findings include an assortment of chemical compounds emitted from each narcotic exhibiting a distinctive odor profile as a factor of age. The data instrumentally validated the changes of target odor volatiles on commonly used canine training aids during routine maintenance training exercises.

- 2:15 027.257 G **An implantable flow monitor for hydrocephalus**, *Chuchu Qin, University of Texas at Arlington; Purnendu K. Dasgupta, UT Arlington*  
In hydrocephalus, cerebrospinal fluid (CSF) builds up in the cranial cavity, causing swelling of the head and potentially, brain damage. A shunt to drain the fluid into a body cavity is universally used, but shunt failure is all too common. Techniques for ascertaining shunt failure are time-consuming, expertise-dependent, and

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often inconclusive. We report an inline system that reliably and quantitatively measures the CSF flow rate. The system uses a single thermistor to both heat the surrounding and to sense the temperature. In heating mode, the thermistor is subjected to a 5 s voltage pulse. In sensing mode, it is part of a Wheatstone's bridge, the output being proportional to temperature. The signal,  $V_i - V_f$ , which is the net change  $\Delta V$  in the bridge output from immediately before and after the heat pulse, depends both on the flow rate and the surrounding temperature. In vitro, a single equation involving both  $\Delta V$  and  $V_i$  provided good prediction for the flow rate, with 6.3% RMS relative error. The sensor behavior is reported for flow rates between 0-52.5 mL/h at 32-39 °C, adequately covering the range of interest. The functionality of flow monitor has been verified on a healthy pig model. Six of eight tests with experimental pigs were successfully conducted with > 4300 acceptable flow measurements. Good correlation was observed between measured and predicted flow rates ( $r > 0.9$ ). The average slope of measured vs predicted flow rates was  $1.04 \pm 0.15$ , indicating that the flow monitor accurately measured porcine CSF flow.

2:30 027.258 G **Triethylsiloxymethyl-N-N-dimethylamine as a Mannich reagent: The varied chemistry with anilines**, Anwar Jacintomoreno, *The University of Texas at El Paso*; Alejandro Metta-Magaña, *The University of Texas at El Paso*; Hemant K. Sharma, *The University of Texas at El Paso*; Keith Pannell, *University of Texas at El Paso*

We have reported the ability of triethylsiloxymethyl-N-N-dimethylamine [Et<sub>3</sub>SiOCH<sub>2</sub>NMe<sub>2</sub>], I, to act as Mannich reagent with amines, alcohols and thiols. [1]. When I is reacted with aniline, PhNH<sub>2</sub>, the reaction resulted in the initial formation of the triamine Me<sub>2</sub>NCH<sub>2</sub>-NPh-CH<sub>2</sub>NMe<sub>2</sub>, II, which underwent elimination by expelling Me<sub>2</sub>NCH<sub>2</sub>NMe<sub>2</sub> to form an unstable imine PhN=CH<sub>2</sub>, III. The imine, which cannot be observed spectroscopically, trimerizes into 1,3,5-triphenyltriazine, IV, which is isolated and characterized. We have investigated the scope of this reaction with a series of anilines containing electron-donating and -withdrawing substituents, ArNH<sub>2</sub>. We observed direct formation of the triazines when electron-donating substituents are present, but with electron-withdrawing groups we note the formation of secondary diamines, ArNH-CH<sub>2</sub>-NMe<sub>2</sub>, V. Furthermore, when using a sterically hindered aniline we have kinetically stabilized and characterized spectroscopically by NMR and by single crystal X-ray diffraction, the previously unobserved but postulated imine, ArN=CH<sub>2</sub>, VI. Overall we have demonstrated the product distribution range of the chemistry of anilines, i.e. II, III, IV, and V, dependent upon the electronic effects of the substituents. [1] (a) Sharma, H. K. et al. *Chemistry - A European Journal* 2016, 22, 7363-7366. (b) Gonzalez, P. et al. *European Journal of Organic Chemistry* 2017, 5610-5616.

**028. Graduate Competition Oral Session 2**

3:00 to 3:45 pm

Carrasco Building, Lecture Room

Graduate Student Paper Competition

Graduate Competition Oral Session 2

Participants:

3:00 028.259 G **Detecting presence or absence of alternative splicing at the *superkdr* locus in horn fly, *Haematobia irritans***, Gabriela Solis, *Texas State University*

Changes to pest control efforts are dependent on the interaction that occurs between insecticides and the pest in question. *Haematobia irritans* are agricultural pests that have had negative economic consequences due to their detrimental effects on cattle and their development of insecticide resistance. The *superkdr* locus has a single base change, from a thymine to a cytosine, resulting in replacement of methionine with threonine; this mutation has been associated with pyrethroid-resistant horn flies. The purpose of this research is to determine if alternative splicing is occurring at the *superkdr* locus. Two different methods were performed to determine the presence or absence of alternative splicing. The first method involved sequence analysis of the sodium channel gene containing the *superkdr* locus. cDNA and genomic DNA were cloned, sequenced, and compared using MacVector. The second method used a SNP assay. With the SNP assay, one can genotype the *superkdr* locus in cDNA and genomic DNA, and simultaneously detect alternative splicing if the locus was not detected in cDNA. There was no significant difference between the genotype of the *superkdr* locus in cDNA compared to genomic DNA. If alternative splicing of the *superkdr* is occurring, it seems to be rare. Overall, this shows genomic DNA can be used to determine the prevalence of pyrethroid-resistance population. The SNP assay used to genotype is both time and cost-effective, and it can be used to determine if pyrethroid is the best choice of insecticide to use depending on the prevalence of pyrethroid-resistance in a wild population.

3:15 028.260 G **Laser-Enhanced sustained attention and working memory in neurocognitive disorder**, Celeste L. Saucedo, *University of Texas at Austin*; Courtney Alexander, *University of Texas at Austin*; Douglas W. Barrett, *The University of Texas at Austin*; F. Gonzalez-Lima, *The University of Texas at Austin*

We investigated for the first time the influence of prefrontal infrared laser stimulation on sustained attention and working memory in older adults experiencing symptoms of mild neurocognitive disorder. Transcranial infrared laser stimulation involves using infrared light to enhance neurobiological functions. We have previously shown that, when targeted at the prefrontal cortex, infrared laser stimulation can improve executive function, rule-based category learning, sustained attention and working

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memory in a young healthy population. In this ongoing project, older participants (ages 18-74,  $n=10$ ) with symptoms of mild neurocognitive disorder completed a psychomotor vigilance task (PVT) and two delayed match-to-sample tasks (DMS), one easier and another more difficult DMS task (i.e., 4x4 and 6x6 matrix), before and after four or six weekly laser sessions. Preliminary findings revealed improved sustained attention as measured by PVT reaction time in 6 participants. Working memory accuracy as measured by number of correct responses improved in 5 participants on the easy task (DMS 4x4) and 6 participants on the difficult task (DMS 6x6). Additionally, 3 of the 5 participants that improved on DMS 4x4 and 4 of the 6 that improved on DMS 6x6 also showed improvement in memory retrieval times. This novel, non-invasive technique has been shown to up-regulate the amount of the respiratory enzyme cytochrome oxidase, enhancing neuronal capacity for metabolic energy production used to support cognitive brain functions. Applications of transcranial infrared laser stimulation in humans *in vivo* are novel, and preliminary research indicates promise for wide-ranging experimental and clinical applications, including prevention of cognitive decline.

- 3:30 028.261 G **Specimen dates and species longevity: an evaluation of temporal range data for questions of ancestry in the hominin fossil record**, Timothy Lee Campbell, Department of Anthropology, Texas A&M University; Chris A. Robinson, Department of Biological Sciences, Bronx Community College; Susanne Cote, Department of Anthropology and Archaeology, University of Calgary; Darryl J. de Ruiter, Department of Anthropology, Texas A&M University

Utilizing *Australopithecus sediba* as a case study, we evaluate statements implying that this taxon cannot be ancestral to *Homo* as the specimens from Malapa are found later in time (~1.98 Ma) than the earliest proposed examples of our genus (~2.8–2.4 Ma). For hypotheses about the ancestral nature of *A. sediba* to be plausible, two things must be established. First, it must be possible for ancestral and descendant taxa to coexist. Under a budding cladogenesis model of speciation a subset of a species differentiates into a new daughter taxon while the remainder of the species maintains cohesion. Among mammals, contemporaneous ancestral and descendant taxa are reported in the literature, ranging from rodents to proboscideans. Second, the amount of time represented by a “ghost lineage” must be reasonable. Many studies that have estimated the average mammal species duration have values ranging between 2-4 Ma, although these estimates are dependent on the dataset used and the taxonomic group. Utilizing published temporal range data of fossil hominin species, and incorporating proposed dating error, we calculate a conservative average hominin species temporal range of ~0.97 Myr.

Using this estimate in a thought experiment wherein Malapa represents the first appearance date (FAD), midrange date, or last appearance date of the species, possible FAD's for *A. sediba* range from 2.95–1.98 Ma. As these scenarios are all equally plausible, there is no a priori reason that *A. sediba* could not be ancestral to *Homo* based solely on the dates of the specimens currently known.

- 3:45 028.262 G **Synthesis of biodiesel fuels via transesterification using acorn (*Quercus sp.*) as an alternative triglyceride source**, Darean Bague, Stephen F. Austin State University; Russell J Franks, Ph.D., Stephen F. Austin State University  
Biodiesel has been promoted as an alternative to petroleum-based diesel fuel. Generally, biodiesel fuel is produced via transesterification of a triglyceride (e.g. vegetable oil, waste cooking oil, animal fats) with a short alkyl chain alcohol using an acidic or basic catalyst. Alternative triglyceride sources, ones not derived from plants used as human food sources, have been of particular recent interest. In this work, the oil extracted from the endosperm of acorns, acorn kernel oil (AKO), was used as an alternative triglyceride source for the synthesis of biodiesel fuel. A variety of acorns were collected from oak trees (*Quercus sp.*) in the city of Nacogdoches, Texas. Acorn kernel oil was extracted from the acorn endosperm using heptane. The AKO was subjected to acid-catalyzed and base-catalyzed transesterification with methanol and ethanol to produce acorn kernel oil methyl esters (AKOME) and acorn kernel oil ethyl esters (AKOEE), respectively. Acid-catalyzed transesterification of the AKO was performed using conventional heating, whereas the base-catalyzed transesterification of the AKO was performed using both conventional heating and microwave-assisted heating. Concentrated H<sub>2</sub>SO<sub>4</sub> was used as the acid catalyst and K<sub>2</sub>CO<sub>3</sub> was used as the base catalyst. The effects of using an ionic liquid on the overall conversion for the reaction were also studied. Product mixtures were characterized using <sup>1</sup>H-NMR spectroscopy. The NMR data were used to confirm the presence of AKOME and AKOEE products as well as to quantify the percentage conversion for the reaction.

- 4:00 028.263 G **The taxonomic and anatomical diversification of mosasaurs during the Late Cretaceous: a study system for understanding evolution in a greenhouse world**, Joshua Ryan Lively, The University of Texas at Austin  
I explore the diversification of mosasaurs, marine squamates that lived during the Late Cretaceous. Mosasaurs are traditionally divided into four sub-familial clades. The most diverse of those clades was the Mosasaurinae. I discuss two new genera of mosasaurines from North America and their importance for understanding mosasaur evolution. The Late Cretaceous was a time of greenhouse climate, with

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higher temperatures and a reduced latitudinal thermal gradient. Because of their high diversity and exceptional fossil record, mosasaurs are an ideal study system for understanding evolution during greenhouse conditions. I collected discrete osteological character data from over 275 mosasaur specimens, sampling the known diversity from the Cretaceous of North America. In addition to traditional phylogenetic analyses, I performed a pair-wise dissimilarity analysis to understand disparity, or anatomical diversity, in mosasaurs through the Cretaceous. Initial diversification occurred by the Coniacian with the evolution of the major lineages of mosasaurs. Within the Mosasaurinae, diversity and disparity increased during the Early Campanian, a time of relative cooling during the Cretaceous. Based on my analyses, the phylogenetic position of the two new mosasaurine taxa supports a more complex pattern of diversification than what was previously hypothesized. Prior to that diversification, geologically older mosasaurines exhibited higher levels of variation than other mosasaur lineages. My results support a combination of environmental change and intraspecific variability led to taxonomic, anatomical, and likely ecological diversification during the Late Cretaceous.



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