128th Annual Meeting

Feb 28 – Mar 1, 2025 Waco, Texas

TAS

Texas Academy of Science

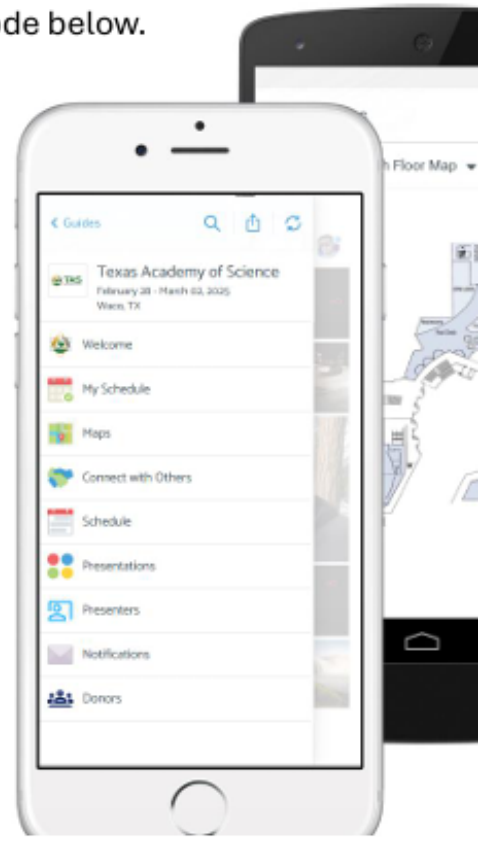
BAYLOR UNIVERSITY

McLENNAN COMMUNITY COLLEGE

Official Program

The Texas Academy of Science 128th Annual Meeting has gone mobile!

Download the free app using QR code below.



1. Tap “download the app” to access the guide on your iOS or Android device.
2. Open the app “Ex Ordo”
3. To load the guide, tap “search’.
4. At the bottom of the search screen, tap the button that says “Have a passphrase?”
5. Use the passphrase: **tas2025**
6. When prompted, choose download the guide.

If you have an Ex Ordo account (you submitted an abstract) you can login to the app using that account and password for increased personalization, however this is not required.

Welcome from the TAS President

I am excited to welcome everyone to Waco for the 2025 Annual Meeting of the Texas Academy of Science! Located in the heart of Texas, Waco is a dynamic and rapidly evolving community – if you haven't been here lately, you may be astonished by our growth.

While we are all here for the science, I believe that this meeting will also show off our city, with events being held on the beautiful campuses of both McLennan Community College and Baylor University. The awesome cooperation between these two institutions has made this meeting possible!

It is important to recognize the people who really put together this meeting. The local organizers – Professors Shannon Hill (MCC) and Christie Sayes (BU) – have been working non-stop to organize the venues and logistics that are so critical to the success of this meeting.

Alongside the local organizers, our President-Elect Maria Burns (UH) has done an awesome job organizing the meeting program – putting 334 submitted presentations together with two great award lectures and numerous other activities to fill your days in Waco to the brim. Numerous others have helped as well, with my personal thanks to the TAS 'Coordinator of IT' Professor Christopher Vitek (UTRGV) who always keeps the wheels on the bus...

Have a GREAT meeting – I am looking forward to seeing the great science that everyone is bringing to share in WACO!

Sincerely,

Robert R. "Bob" Kane, Ph.D.
President, Texas Academy of Science
Department of Chemistry and Biochemistry,
Baylor University

CITY OF WACO

Jim Holmes
Mayor
PO Box 2570
Waco, Texas 76702-2570

T: (254) 750 5750
waco-texas.com

17 February 2025

Greetings,

On behalf of the City of Waco, I am pleased to welcome you to our vibrant city. We are glad that you traveled to Waco for the Texas Academy of Science Annual Meeting, taking place February 28 through March 1, 2025.

It is my hope that you will have a memorable time, and visit some of the attractions, try out our restaurants, and enjoy the shopping that Waco has to offer. The area around downtown and the Silo District continues to grow and thrive, with new shops and restaurants opening each week.

Waco provides many options for entertainment and fun. While you're here, be sure to check out some of Waco's most interesting attractions: Waco Mammoth National Monument, Texas Ranger Hall of Fame & Museum, Dr Pepper Museum, Texas Sports Hall of Fame, Cameron Park, and Cameron Park Zoo, as well as all the other great attractions that make Waco so unique. Our downtown is one of the most walkable in the state, with shopping, restaurants, and entertainment just steps away from our downtown suspension bridge.

The City of Waco is honored to host you while you share your exciting scientific discoveries with your colleagues and network with this great group of Texas scientists. Again, we are pleased to have you as our guests and wish you and your group a wonderful time in Waco!

Sincerely,

Jim Holmes
Mayor
City of Waco

UNIVERSITY OF HOUSTON

Welcome from the Program Chair

Dear Members and Colleagues of the Texas Academy of Science,

It is my distinct pleasure to welcome you to the 128th Annual Meeting of the Texas Academy of Science, hosted jointly by Baylor University and McLennan Community College in the vibrant city of Waco, Texas. This year's meeting promises to be exceptional, with a record number of presentations and posters showcasing the outstanding scientific work being conducted across our state.

Kudos to Robert R. "Bob" Kane, Ph.D., our current TAS President, for his vision, leadership, and immense support. TAS comprises an amazing team of Directors and individuals. Thank you to our local hosts, Dr. Christie Sayes of Baylor University and Dr. Shannon K. Hill of McLennan Community College, for their generous hospitality and meticulous planning. Thanks to the TAS Board of Directors, Section Chairs, and Vice Chairs for their excellent job; Dr. Gerald J. Mulvey, TAS Development Chair, whose efforts secured valuable industry sponsorships; Dr. Christopher Vitec, our IT Director, whose technical expertise was invaluable throughout the planning process; Dr. Kathy Wood, our Treasurer, for her wisdom and guidance; Dr. Craig Younce, our VP, for his support.

We all look forward to promoting the work of TAS through engaging discussions, inspiring presentations, and the opportunity to reconnect with colleagues while forging new professional relationships. Thank you for being part of this exciting gathering of Texas's scientific community.

Warmest regards,

Marcella Burns

Maria "Marcella" Burns, Ph.D.
TAS President Elect (2024-2025)
Academic Director TLIM, and Faculty Information Science Technology Department
University of Houston

Baylor University

Welcome from the Host University

February 19, 2025

Dear Texas Academy of Science Attendees,

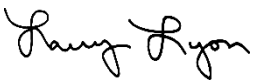
On behalf of the Graduate School and Baylor University, it is my sincere pleasure to welcome you to the Hurd Center for this Texas Academy of Science meeting. We are delighted to host this exciting event that brings together students and faculty from across the state.

We especially look forward to the presentations by our Outstanding Texas Educator, Mark Rogers of Austin Achieve Public Schools, and our Distinguished Texas Scientist, Dr. Jingbo Louise Liu, Professor of Chemistry at Texas A&M University-Kingsville. We thank them both for their noteworthy contributions to STEM education in our state.

We trust you will enjoy your time on campus and in Waco. Please do not hesitate to ask the Hurd or other Baylor staff for assistance during your visit. They are there to help ensure your experience is positive and memorable.

Again, welcome to Baylor University (and Sic 'em Bears!).

Sincerely,



Larry Lyon
Vice Provost and Dean of the Graduate School

MCLENNAN COMMUNITY COLLEGE

January 27, 2025

To members of the Texas Academy of Science:

Welcome, everyone! McLennan Community College is please to co-host the 2025 Texas Academy of Science Annual Meeting!

The entire Waco/McLennan Community College area is thrilled to be hosting this event for the first time, and we are looking forward to an exciting time!

The McLennan Science Department and the entire McLennan Community College family welcomes faculty and students from all over Texas to what promises to be an incredible week. If you find some time to relax along the way, we hope you will take advantage of our many entertainment venues and attractions. Here are links to a couple of websites that may be helpful: https://wacochamber.com/waco-attractions/ and https://destinationwaco.org/things-to-do/.

We are glad you are here for this spectacular event and hope you have a great time here. Enjoy the conference and have a wonderful time in Waco!

Sincerely,

Johnette McKown
President

MCLENNAN COMMUNITY COLLEGE

Welcome to McLennan Community College; we are thrilled to co-host the august membership of the Texas Academy of Science! Established in 1965, MCC sits on the bank of the Bosque River atop limestone bluffs, which are part of the Austin Chalk Formation. The dense riparian vegetation provides rich habitat for a wide-variety of species, including a robust population of greater roadrunners. We encourage you to explore and enjoy our beautiful campus!

For the first time in TAS history, the Annual Meeting is being co-hosted by 2 institutions, McLennan Community College and our esteemed neighbor downstream, Baylor University. This has been a dynamic and productive collaboration and we hope that you get the best of both worlds!

We deeply appreciate and share the Academy's mission of promoting scientific excellence and supporting student success. We hope that you find the meeting informative and fun!

Sincerely,

Shannon K. Hill, Ph.D.
Division Chair of Math and Science
McLennan Community College

Welcome from the Development Chair

Welcome to the 128th Annual Meeting of the Texas Academy of Science.

In the past years, we embarked on a new initiative to enhance recognition for our members, especially our student members. Each of our Board of Directors generously contributed to a new fund drive, with the collected funds supporting the Academy as a whole. We were also excited to introduce special conference recognitions for our TAS Fellows. These include an invitation to the Presidential Breakfast, special badge ribbons, and other acknowledgments of their achievements.

Looking ahead, we will launch a fundraising campaign to increase the number and value of awards for top student presentations at the 2025 Annual Meeting: Our goal is to encourage all students to excel in their chosen fields, thereby boosting the number and quality of STEM students entering the Texas workforce. Details of this effort will be announced later this year.

Enjoy the meeting and the beautiful city of Waco, Texas!

Gerald J. Mulvey, Ph.D., CCM
Texas Academy of Science - Member Board of Directors - Development Committee Chair
President and Chief Scientist Nighthawk Weather LLC

Welcome from the Treasurer

I am so glad that all of you have joined us this year for our Annual Conference and I hope that this time proves to be both an encouragement and a stimulus for you not only in your own work but also in your engagement with the Texas Academy of Science.

One of the things that I really appreciate about TAS is that it is an organization completely maintained by volunteers. Volunteers that already have a "day job" that keeps them extremely busy. They really don't need to add anything else to their to-do list… And yet they spend hours making sure that TAS can be one of the premier organizations in our state. Therefore, we are always looking for new people like you to help make TAS even better. Every year there are positions that we need to fill from our membership and we hope that in the future you might consider volunteering for one of these positions.

A few years ago it was my honor to serve as President of TAS. It was not something that I was seeking at the time but I'm glad that I said yes when a fellow member asked me to consider it. All in all, the 12 years that I have served TAS as President and later as Treasurer have taught me a lot and helped me make some very good friends with a variety of professionals and scientists across the state. I'm looking forward to continued association with an organization that I have grown to love and respect.

Mary Kathleen Wood

Kathleen Wood, Ph.D. (retired)
Treasurer, Texas Academy of Science

Welcome from the TAS Coordinator of Information Technology

It is my pleasure to join in welcoming you to Waco for the 128th annual meeting of the Texas Academy of Science. I can verify that a number of people have been putting a lot of effort to pull this together, so I would like to specifically recognize Dr. Maria Burns (President-elect), and our two local hosts, Dr. Shannon Hill (at McLennan Community College) and Dr. Christie Sayes (at Baylor University). All these of these volunteers, as well as many others, have done an amazing job putting this meeting together.

I would also like to thank both participating campuses – McLennan Community College and Baylor University. Without the participation of both of these institutes, this meeting would not be possible. So if you have the time please take the opportunity to say thank you to the local hosts, and certainly to the many volunteers that help make this meeting work. Lastly, I would like to recognize the volunteers within the Academy – this academy runs through volunteer efforts, including people serving on the Board, and without their work and dedication the Academy would cease to exist.

I look forward to meeting many of you, and learning some amazing science, especially from our student authors. It is my hope that our behind-the-scenes work has made this meeting as glitch-free and as smooth an experience as possible. Take your time to learn some new science, experience both campuses, and explore Waco.

Sincerely,

Christopher Vitek
Coordinator of Information Technology, Texas Academy of Science
School for Integrative Biological and Chemical Sciences
University of Texas Rio Grande Valley

About the Texas Academy of Science

History

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

Mission

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

Strategic Planning

The Texas Academy of Science (TAS) Board of Directors approved a vision for a 5-year Strategic Plan: “to increase the visibility and effectiveness of TAS in promoting strong science in Texas.” As part of that initiative, the Academy seeks to reach out to foundations and organizations that support and benefit the Texas science community. We believe that a number of opportunities exist for strategic partnerships that could bolster the impact of organizations that raise the profile of science in 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.

Baylor University, Waco (TX)

Baylor University, established in 1845, is the oldest continually operating university in Texas. This private Christian university is renowned for its commitment to academic excellence and research. Baylor offers a wide range of undergraduate, graduate, and professional programs across its 12 nationally recognized academic divisions. The university's picturesque campus spans approximately 1,000 acres along the Brazos River, providing a vibrant and supportive environment for over 20,000 students from all 50 states and more than 90 countries. Baylor is also known for its strong athletic programs, particularly in basketball and football.

McLennan Community College, Waco (TX)

McLennan Community College (MCC), located on a scenic 275-acre campus adjacent to Cameron Park and the Bosque River, offers a diverse array of educational opportunities. Established in 1965, MCC serves approximately 8,500 students each semester, providing pathways to associate degrees, certificates, and transfer programs to four-year universities. The college is recognized for its beautiful campus, outstanding architecture, and commitment to sustainability. MCC's faculty are dedicated to student success, offering personalized support and a wide range of extracurricular activities to enhance the college experience.

Waco, Texas

Waco, Texas, located along the Brazos River and I-35, is a vibrant city known for its rich history and cultural attractions. Founded in 1849, Waco has grown into a bustling community with a population of approximately 144,816. The city is home to notable landmarks such as the Waco Mammoth National Monument, the Texas Ranger Hall of Fame and Museum, and the Dr. Pepper Museum. Waco's economy is diverse, with strong sectors in education,
manufacturing, and tourism. The city also gained national attention through the popular home renovation show "Fixer Upper," which has contributed to a surge in local tourism.

Texas Academy of Science Officers 2024-2025

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Matthew Barnes
Texas Tech University

President
Bob Kane
Baylor University

President Elect
Maria Burns
University of Houston

Vice President
Craig Younce
Hardin-Simmons University

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Kathleen Wood
Univ. of Mary Hardin-Baylor (retired)

Collegiate Academy Counselor
Milka Montes
University of Texas Permian Basin

Collegiate Academy Co-Counselor
Karen Grant
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Chair, Board of Development
Gerald Mulvey
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2025-2026 Student Representative
Jennifer Hunt
University of Texas Permian Basin

2024-2025 Student Representative
Kristen Collier
Angelo State University

Executive Secretary
Christopher Ritzi
Sul Ross State University

Corresponding Secretary
Louise Liu
Texas A&M Kingsville

2025 Local Hosts
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Shannon Hill, McLennan Community College

Coordinator of Information Technology
Christopher Vitek
University of Texas Rio Grande Valley

Graduate Academy Counselor
Travis LaDuc
University of Texas at Austin

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Temple College

AAAS Representative
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Temple College

2023-2026 Academic Director
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Manuscript Editor of TJS
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2024-2027 Non-Academic Director
OPEN

2023-2026 Non-Academic Director
Megan Bean
Texas Parks and Wildlife

2022-2025 Non-Academic Director
Gerald Mulvey
Nighthawk Weather LLC

Historian, TX Academy of Science
Raymond C. Mathews, Jr.
Lady Bird Johnson Wildflower Center International

Program Coordinator
Hugo A. Barrera-Saldaña
Autonomous University of Nuevo Leon
Monterrey, Nuevo Leon, México

Texas Academy of Science 2025 Awardees

Distinguished Texas Scientist

Dr. Jingbo Louise Liu

Professor of Chemistry, Department of Chemistry, Texas A&M University-Kingsville

Dr. Jingbo Louise Liu is an experienced leader in science and technology, renowned for her impactful contributions to renewable energy research and commitment to scientific innovation. With over two decades of leadership experience and a Ph.D. in Materials Science and Engineering, she bridges the gap between cutting-edge research and strategic program leadership. Her belief in education and mentorship aligns with building an inclusive scientific community, engaging scientists and engineers at all levels. Dr. Liu's approach transcends traditional boundaries, combining academic discipline with practical impact, essential for organizations meeting modern science and technology challenges. Her blend of technical understanding and strategic insight supports scientific missions and enhances organizational performance. Dr. Liu's leadership in securing funding and peer recognition showcases her exceptional caliber in stewarding innovative pursuits. As a proactive thinker and charismatic communicator, she embodies the transformative leadership essential for intellectual and technological evolution within the scientific community.

Outstanding Texas Educator

Mark Rogers

Austin Achieve, Austin Texas – Math

Mark Rogers is a National Board Certified mathematics educator at Austin Achieve in Austin, Texas, where he's pioneering a unique 13-year "looping" project, advancing with the same student cohort from kindergarten through graduation. A two-time State Finalist for the Presidential Award for Excellence in Math and Science Teaching (2024 & 2017), Rogers is known for his innovative teaching methods, including creating mathematical music videos and integrating real-world applications into his lessons.

Before joining Austin Achieve in 2018, he taught at Meridian School, where his work with the inaugural graduating class contributed to the school's #1 ranking in Texas by US News & World Report. An SXSWedu Advisory Board member and recipient of numerous teaching awards, Rogers brings diverse experience from his previous roles as a Morgan Stanley Investment Analyst and Quality Assurance Manager. He holds a Master of Education from Western Governors University and degrees from The University of Texas at Austin.

Texas Academy of Science 2025 New Officers

Vice President (2025-6)

Dr. Dennis Gibson II

Chair of Physical Sciences, Howard Payne University

Dr. Gibson II is the Chair of Physical Sciences at Howard Payne University in Brownwood, Texas. He is an Environmental-Analytical Chemist and is currently investigating how environmental pollutants impact the development of cells and their structure.

His current research topic is investigating novel low-cost stains for imaging microplastics with fluorescent microscopy in various environments. He also developed HPU's Summer Research Symposium which invites area high school students to perform summer research alongside undergraduate students.

This program ends with an oral presentation and an abstract submission to a regional conference.

Non-Academic Director 2025-2028

Dr. Darin Frye

Chief Science Director, Navy Medical Research Command – San Antonio

Dr. Darrin L. Frye is a decorated preventive medicine physician, former citizen soldier, global educator, and dedicated researcher. He served in Operations' Enduring and Iraqi Freedom, earning the Bronze Star Medal with the Army, and selected International Physician of the Year by the Palm Beach Medical Society.

As an Associate Professor for the Joint Special Operations University, Dr. Frye led the Science and Technology and Innovative Futures Department.

He now serves as the Chief Science Director for the Navy Medical Research Command - San Antonio, where he leads teams focused on combat casualty care reducing preventable deaths on the battlefield.

Student Director

Ms. Dhivya Rajamanickam

PhD Student, Baylor University

Ms. Dhivya Rajamanickam is a third-year Ph.D. student in Biology at Baylor University, researching mosquito surveillance, blood meal analysis, and brain histochemistry of Aedes aegypti mosquitoes under Dr. Jason Pitts. She leads mosquito surveys at Cameron Park Zoo, analyzes host preferences, and investigates avian malaria pathogens. She also studies brain histochemistry in Orco mutant Aedes aegypti to understand their olfactory mechanisms.

Passionate about teaching, she has been a Teaching Assistant for Bio Heroes, BU Trees, and Genetics Lab. Her leadership roles include Young Professionals at Texas and American Mosquito Control Associations, International Recruitment Chair at CEGSS, Mental Health Ally at Baylor, and Volunteer at Mayborn Museum. Her goal is to continue research on mosquito-borne diseases and vector biology.

New TAS Fellow

Dr. Maria “Marcella” Burns

Program Director & Faculty, Information Science Tech Department, University of Houston

Dr. Maria Burns serves as the Program Director and Assistant Professor of the Technology Leadership and Innovation Management program at the University of Houston’s Information Science Technology Department, Cullen College of Engineering, and is the Incoming TAS President for 2025-2026. Her research specializes in Artificial Intelligence and Machine Learning applications within the Maritime Transportation and Energy Industries. As a PI and Co-PI, she has secured over $1,700,000 in research funding, focusing on data science and critical infrastructure security. Dr. Burns employs demographics, policy analysis, and geospatial modeling to tackle socio-economic and health challenges. She is an Honorary Member of the U.S. Coast Guard Auxiliary, and was bestowed awards from the Texas Department of Public Safety, Taylor & Francis Publishers, and the Texas Emergency Management Advisory Committee (TEMAC).

TAS Awards Banquet Agenda

HURD @ Baylor University
5:30 pm – 8:15 pm Saturday,
March 1, 2025

Welcome from TAS	Dr. *Robert Kane, TAS President & Master of Ceremonies*
Outstanding Texas Educator Award Distinguished Texas Scientist Award New TAS Fellow	Dr. Craig Younce, TAS Vice President
Undergraduate Poster Awards Undergraduate Oral Presentation Awards	*Dr. Milka Montes, Collegiate Academy Counselor*
Sammy Ray Marine Science Award	*Madelyn Knauss, Texas Tech University*
Amir-Moez Award for Excellence in Mathematics	*Dipak Singh, Stephen F. Austin State University Mathematics & Computer Science Chair*
Graduate Student Presentation Competition Awards *Student Research Grants*	*Dr. Travis LaDuc, Graduate Academy Counselor*
Recognition of Outgoing Board Members	*Dr. Robert Kane, TAS President*
Recognition of New Board Members Introduction of New TAS President	
Closing Remarks	*Dr. Maria Burns, Incoming TAS President*

Want a T-Shirt?

Donate $20 and get a t-shirt!

Main Campus Buildings

1 Community Services Center (CSC)
- Community Clinic at MCC
- Conference Center
- Tartan Cafe

2 Northwood House (NH)
3 Physical Plant (PHP)
4 Mathematics (MATH), Wellness & Fitness (WF)
5 MCC Foundation (MCCF)
6 The Highlands Gym (H)
7 Highlander Drive Parking Garage (HD PG)
8 Music & Theatre Arts (MTA)
9 Ball Performing Arts Center (BPAC)
- Box Office

10 Business Technology (BTB)
11 Highland Arbor (HA)
12 Enrollment Services Center (ESC)
- Highlander Central

13 Administration (A)
14 Starr Plaza (SP)
15 Learning Technology Center (LTC)
- Highlander Cafe
- McKown Learning Commons (Library)

16 Watson Arbor (WA)
17 Michaelis Academic Center (MAC)
- MCC Bookstore
- The Thistle Stop Cafe
- University Center

18 Student Services (SS)
- Campus Police
- Student Life Center (SLC)

19 Liberal Arts (LA)
20 Faculty Office (FO)
21 Lecture Hall (LH)
Research & Effectiveness (RE)
22 Health Professions (HP)
23 Health Professions Nursing (HPN)
24 Health Professions Simulation (HPS)
25 Science (S)
26 Central Utilities (CU)
27 Cameron Drive Parking Garage (CD PG)
28 Intramural Fields (IF)
29 Softball Field (SBF)
30 Bosque River Ballpark (BRB)
31 Field House (FH)
32 Baseball Field (BF)
33 Bosque River Stage (BRS)
34 Boat Ramp (BR)

Map Key

- Emergency Call Boxes
- Open Parking Lots
- Gated Parking Lots
- Bus Stop
- Highlander Central (ESC)
  - Admissions
  - Financial Aid
  - Information

Off-Site Facilities

ESEC Emergency Services Education Center
7601 Steinbeck Bend Road (Waco)

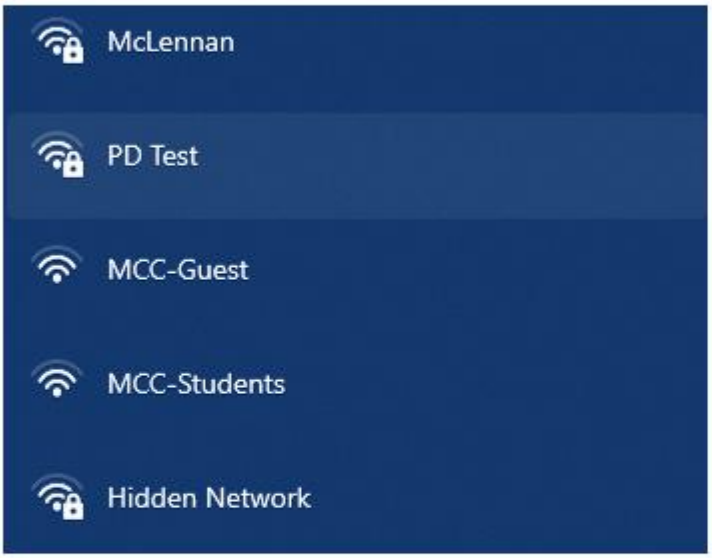
HR Highlander Ranch
223A Cobbs Lane (Bosqueville)

Escanee aquí para obtener mapas digitales en español.

McLENNAN COMMUNITY COLLEGE
1400 College Drive • Waco, Texas (254)299-8622
www.mclennan.edu

TAS Conference WiFi at MCC

1. Open your WiFi management screen.



2. Select the "**TAS Conference**" network.
3. Type in the password: **stemexcellence**


A B C D E F G H I J
1 2 3 4 5 6 7 8 9 10
Baylor University
1 B6 Baylor Bookstore
2 F6 Baylor Sciences Building
3 B7 Lot #23: Behind Bill Daniel
4 B5 Lot #34: Hurd Visitor parking
5 D7 Lot #36: Cashion
6 C5 Lot #45: Dutton Garage
7 B3 Lot #58: Clifton Robinson Tower
8 E5 Lot #61: Mayborn
9 C4 Mark & Paula Hurd Welcome Center
E 11th St
S Loop Dr
FM 434
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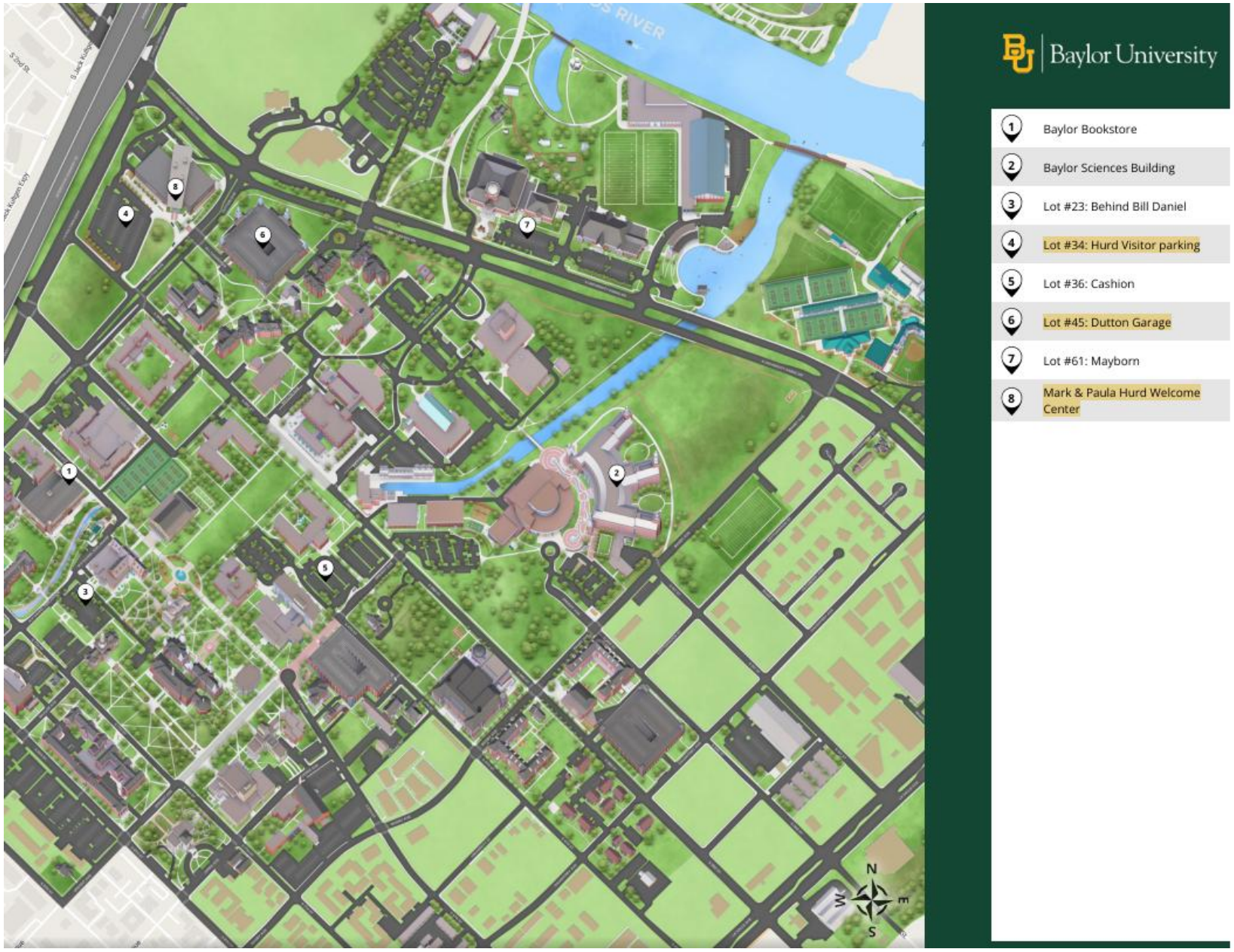
Baylor University
1 Baylor Bookstore
2 Baylor Sciences Building
3 Lot #23: Behind Bill Daniel
4 Lot #34: Hurd Visitor parking
5 Lot #36: Cashion
6 Lot #45: Dutton Garage
7 Lot #61: Mayborn
8 Mark & Paula Hurd Welcome Center
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Texas Academy of Science **Texas Academy of Science 128th Annual Meeting** Feb 28–Mar 1, 2025

Baylor University

The Events Planned on **Saturday, March 1, 2025**, at the HURD Welcome Center on the Baylor University Campus I-35 and University Parks Drive, Waco, Texas.
Link: https://hurdcenter.web.baylor.edu/contact-location

PARKING

Up to 500
Overflow in Dutton garage

HURD front door

RECEPTION

Souvenir shop

Coffee shop

Interactive Baylor exhibits

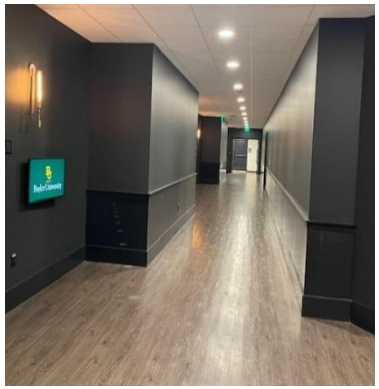
GRADUATE STUDENT PANEL

Large capacity break-out room

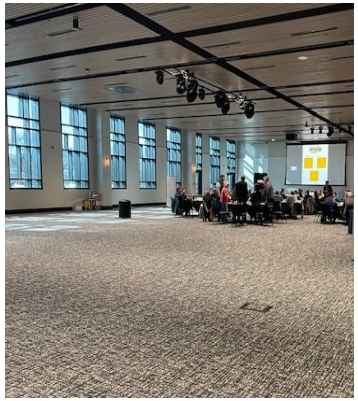
Signage

BANQUET

Separated double-sided food lines



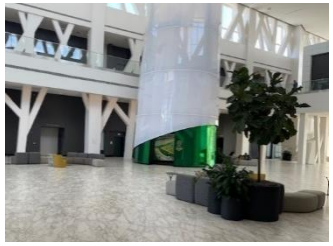
500-700 seating for dinner



Stage with A/V for the MC

FACULTY

Large open space



Niche seating areas

BOOTHS

Tables and poster stands provided

Welcome to Waco!

Eats!

Ninfa's: Mexican
- 220 South 3rd Street

Portofino: Italian
- 725 Austin Ave

Cava: Mediterranean
- 812 S 6th St

Crickets: American
- 211 Mary Ave

Union hall: An Option for Everyone
- 720 Franklin Ave

Slow rise on the Brazos: Pizza
- 1620 N M.L.K. Jr Blvd

Revival: Burgers/Salads/Sandwiches
- 704 Elm Avenue

Treats!

Dichotomy: coffee, spirits
- 508 Austin Ave

Fabled: coffee, bookstore
- 215 S 4th St

Bitty and Beaus: coffee, gluten-free treats
- 110 Franklin Ave

Heritage Creamery: ice cream
- 1125 S 8th St

Tiffs Treats: cookies
- 720 S 5th St #112

Sub zero: nitrogen ice cream
- 215 South University Parks Dr. #105

Silos baking co.: cupcakes, pastries, etc.
- 601 Webster Ave

Fun!

Putters: drinks, arcade, and putt-putt
- 320 S 2nd St

Twisted Sisters Patio Bar: drinks & fun
- 115 Mary Ave

Lucky bucks bar: drinks, rooftop views
- 319 S 4th St

Southern Roots: pizza, brews, wine
- 219 N 8th St

Spice village: local shopping
- 2nd &, Franklin Ave

Dr pepper museum
- 300 South 5th Street

Magnolia Silos
- 601 Webster Ave

More comprehensive lists:
https://downtownwacotx.com/dine/ https://destinationwaco.org/things-to-do/downtown-waco/
Visit our "grease pit" just across the interstate from Baylor Campus for fast food options!

Brief Schedule

Friday, 28 February

8am

Board of Directors Meeting
MAC 201 @ MCC

9:30am

Registration (MCC)
Science Building Lobby @ MCC

Poster Set-up
Science Building Lobby @ MCC

Student Mixer
MAC 236 @ MCC

11am

Section Chairs Meeting
MAC 204 @ MCC

Administration Office: Treasurer and Collegiate Academy Judges
MAC 108 @ MCC

12:30pm

(S1) Chemistry & Biochemistry A
MAC 111 @ MCC

(S2) STEM Education
MAC 206 @ MCC

(S3) Freshwater Science
MAC 235 @ MCC

(S4) Biomedical Sciences
Lecture Hall @ MCC

(S5) Systematics & Evolutionary Biology
MAC 300 @ MCC

2:30pm

Biomedical Sciences Section Meeting
MAC 200 @ MCC

(S4) Coffee Break
MAC 1st 2nd & 3rd floor lobbies

2:45pm

Freshwater Science Section Meeting
MAC 237 @ MCC

Systematics & Evolutionary Biology Session Meeting
MAC 305 @ MCC

(S3) Coffee Break
MAC 1st 2nd & 3rd floor lobbies

(S5) Coffee Break
MAC 1st 2nd & 3rd floor lobbies

3pm

(S1) Coffee Break
MAC 1st 2nd & 3rd floor lobbies

(S4) Cell & Molecular Biology
Lecture Hall @ MCC

3:15pm

STEM Education Section Meeting
MAC 205 @ MCC

(S1) Chemistry & Biochemistry B
MAC 111 @ MCC

(S2) Coffee Break
MAC 1st 2nd & 3rd floor lobbies

(S3) Marine Science
MAC 235 @ MCC

3:45pm

(S2) Anthropology
MAC 206 @ MCC

4pm

Anthropology Section Meeting
MAC 205 @ MCC

(S2) Geosciences
MAC 206 @ MCC

4:30pm

Marine Science Section Meeting
MAC 237 @ MCC

5:30pm

Geosciences Section Meeting
MAC 205 @ MCC

5:45pm

Cell & Molecular Biology Section Meeting
MAC 200 @ MCC

Poster Session
Science Building Lobby @ MCC

7:45pm

Poster Session Adjourned

Saturday, 1 March

7am

Past Presidents & Fellows Breakfast
MAC 304 @ MCC

7:45am

(S1) Chemistry & Biochemistry C
MAC 111 @ MCC

(S2) Mathematics & Computer Science
MAC 206 @ MCC

(S3) Plant Biology
MAC 235 @ MCC

(S4) Physics & Engineering
Lecture Hall @ MCC

(S5) Neuroscience
MAC 236 @ MCC

Texas Academy of Science 128th Annual Meeting Feb 28–Mar 1, 2025

Continued from **Saturday, 1 March**

8am

Registration
Science Building Lobby @ MCC

Administration Office: Treasurer and Collegiate Academy Judges
MAC 108 @ MCC

8:30am

Plant Biology Section Meeting
MAC 237 @ MCC

8:45am

(S3) Terrestrial Ecology & Management
MAC 235 @ MCC

9:30am

Terrestrial Ecology & Management Section Meeting
MAC 237 @ MCC

Mathematics & Computer Science Section Meeting
MAC 207 @ MCC

Physics & Engineering Section Meeting
MAC 200 @ MCC

(S1) Coffee Break
MAC 1st 2nd & 3rd floor lobbies

(S2) Coffee Break
MAC 1st 2nd & 3rd floor lobbies

(S3) Coffee Break
MAC 1st 2nd & 3rd floor lobbies

(S4) Coffee Break
MAC 1st 2nd & 3rd floor lobbies

9:45am

(S1) Chemistry & Biochemistry D
MAC 111 @ MCC

(S3) Conservation Ecology
MAC 235 @ MCC

10am

Neuroscience Section Meeting
MAC 201 @ MCC

(S5) Coffee Break
MAC 1st 2nd & 3rd floor lobbies

11:15am

Conservation Ecology Section Meeting
MAC 237 @ MCC

11:30am

Chemistry & Biochemistry Section Meeting
MAC 200 @ MCC

Lunch Break
LTC Cafeteria @ MCC

12pm

Section Chairs Post Meeting
MAC 204 @ MCC

12:30pm

Meeting moves from MCC to BU

1pm

Registration (BU)
HURD @ BU

Graduate Student Competition
HURD @ BU

Administration Office: Treasurer and Collegiate Academy Judges
HURD @ BU

3pm

Graduate School Fair
HURD @ BU

Mentoring & Networking Session
HURD @ BU

Faculty Reception
HURD @ BU

Graduate Student Panel
HURD @ BU

4pm

OTE Keynote Talk: Mark Rogers, Austin Achieve, TX
HURD @ BU

4:45pm

DTS Keynote Talk: Dr. Jingbo Louise Liu, Professor of Chemistry, Texas A&M University-Kingsville, TX
HURD @ BU

5:30pm

Awards Banquet
HURD @ BU

8:15pm

TAS Annual Meeting Adjourned

DETAILED SCHEDULE

Friday, 28 February

8am **Board of Directors Meeting**
MAC 201 @ MCC

9:30am **Registration (MCC)**
Science Building Lobby @ MCC

9:30am **Poster Set-up**
Science Building Lobby @ MCC

9:30am **Student Mixer**
MAC 236 @ MCC

11am **Section Chairs Meeting**
MAC 204 @ MCC

11am **Administration Office: Treasurer and Collegiate Academy Judges**
MAC 108 @ MCC

12:30pm **(S1) Chemistry & Biochemistry A**
MAC 111 @ MCC
Chaired by: Darrell Fry and Bidisha Sengupta

12:30pm **Avoiding Oxidant Disproportionation with tert-Butyl Hydroperoxide in Iron Catalyzed Carbon-Hydrogen Bond Oxidations**
» Iris Christopher, Dr. John Gary

12:45pm **Building an Understanding of Ab-Initio Calculations in Steps**
» Dr. Benny Armey

1pm **Catalyst and Oxidant Modifications for Carbon-Hydrogen Bond Oxidations**
» Meghan Jennings, Dr. John Gary

1:15pm **Characterization of Affibody Molecules that Target Crotalid Snake Venoms**
» Dr. Edith Osborne

1:30pm **Computational Insights into Nitrogen Activation Chemistry Utilizing Chalcogen Bonding Interactions**
» Kirk French, Surya Choutipalli, Dr. Kevin Shuford

1:45pm **Crystal growth and characterization of intermetallics for correlated emergent properties: Disorder in Ce2MnGe6**
» Ms. Morgan E. Raines, Mr. Benny C. Schundelmier, Teddy G. Spencer, Dr. Gregory T. McCandless, Dr. Kaya Wei, Dr. Julia Y. Chan

2pm **Development and Synthesis of Improved Prodrugs of TAK-242 (Resatorvid) for Localized and Controlled Delivery**
» Ms. Chloe Sells, Dr. Jessica Kostyo, Prof. Bob Kane

2:15pm **Direct partial oxidation of methane to methanol using dioxygen over superhydrophobic modified catalysts.**
» Oluchukwu Igboenyesi, Dr. Frederick MacDonnell

2:30pm **Granular hydrogel synthesis for an in vitro hydrogel model of brain parenchyma tissue**
» Amanda Mejia, Joseph Dorsey, Noor Nazeer, Nicole Hislop, Sabrina Woodward, Cody Crosby

2:45pm **High-throughput virtual screening of New Delhi metallo-beta-lactamase 1 (NDM-1) in Klebsiella pneumoniae leads to discovery of potential inhibitors**
» Sharon Rong, Dr. Josh T. Beckham

12:30pm **(S2) STEM Education**
MAC 206 @ MCC
Chaired by: Lockwood wcox@lcmcisd.org

Continued from **Friday, 28 February**

12:30pm **Credit as a Financial Asset: Maximizing Opportunities and Minimizing Risks**
» Mr. Anthony Dodson

12:45pm **Engage, Explore, Explain: Elevate Your Vocabulary Game!**
» Mr. Dustin Perez

1pm **Engaging Students with Innovative Teaching Methodology by Integration Music Into Chemistry and Chemical Sciences**
» Jingbo Liu, John-Ryan Lawrence, Sajid Liu

1:15pm **Teaching students mastery of instrumentation using micro-credentialing**
» Darrell Fry

1:30pm **From Classroom to Conference: Integrating Undergraduate Student Research to Transform STEM Education at a Community College**
» Dr. Jason Locklin

1:45pm **Methodical Microplastics: Development of an undergraduate CURE to quantify abundance of microplastic fibers in a local stream**
» Dr. Romi Burks, Mr. Andre Felton

2pm **Social Belonging and Impostor Phenomenon Effects on Student Success in Chemistry**
» Dr. Blain Mamiya, Joyce Macalling, Toluwalase Shobogun

2:15pm **Understanding the community college transfer student landscape in Texas: identifying the gaps to empower transfer success**
» Sariah Kaipat, Trinity Vig, Dr. Jason Locklin

2:30pm **Integrating Generative AI into Undergraduate Biology Courses for Enhanced Literature Reviews and Scientific Writing**
» Dr. Susan Klinedinst

2:45pm **Aquaponics in education: Utilizing a sustainable platform for STEM exploration**
» Ms. Alice Conely, Dr. Matthew Allen

3pm **What a GTA Wants: Training and Professional Development Requests by Graduate Teaching Assistants in STEM**
» Ms. Chloe Sells, Dr. Michelle Herridge

12:30pm (S3) Freshwater Science

MAC 235 @ MCC
Chaired by: Mary Kay Johnston and Cynthia Bashara

12:30pm **Increased salinity suppresses diversity of colonizing invertebrates in a field mesocosm experiment**
» Kale Humphries, Prof. Hayden Hays, Dr. Matthew A. Barnes

12:45pm **Exploring the Impact of Salinity Levels on Food Consumption in the Invasive Crab Species, Rhithropanopeus harrisii**
» Ms. Samantha Hamilton, Dr. Terrence Boyle

1pm **Does taxonomy REALLY matter? Using functional traits to predict aquatic insect presence under altered hydrologic conditions**
» Hayden Hays, Dr. Matthew A. Barnes

1:15pm **Habitat selection in the globular drop snail Helicina orbiculata in East Texas waterways using GIS data**
» Alexander Bell, Dr. Nicholas Negovetich, Dr. Ben Skipper

1:30pm **The effects of variable nutrient stoichiometry on biogeochemical processes in shallow lake mesocosms**
» Alexa Hoke, Isabelle Andersen, Jason Taylor, Katelyn McKindles, Thad Scott

1:45pm **Spatiotemporal Characterization of Microplastic Pollution in Two Urban Ephemeral Systems**
» Mr. Andre Felton, Sue Ellen Gibbs-Huerta, Beauxregard Martinez, Salem Farner, Briaunna Zamarripa, Cristina Mendez, Oscar Hernandez

Continued from **Friday, 28 February**

2pm **Interactions among Hydrilla verticillata and two common native aquatic macrophytes under greenhouse conditions**
» Dr. Jeffrey Hutchinson

2:15pm **Historical Wells and Aquifer Depletion Rates on the Texas High Plains**
» Dr. John Stout

2:30pm **Species sorting and dispersal effects on hyporheic invertebrate functional groups in the Lower Canyons of the Rio Grande.**
» Dr. Benjamin Hutchins, Ms. Zoey Chanin, Dr. Kathryn Perez, Mr. Pete Diaz, Dr. Benjamin Schwartz

12:30pm (S4) Biomedical Sciences

Lecture Hall @ MCC
Chaired by: Joni Ylostalo and Nicole Poritsanos

12:30pm **Comparative Analysis of B-Cell Repertoire and Therapeutic Antibody Variability: Implications for Phage Display Library Design**
» Mr. Tarun Hariharan

12:45pm **Activity of Atorvastatin Combined With Chemotherapeutic Drugs on Patient-Derived Neuroblastoma Cell Lines**
» Ms. Hannah Floyd, Mr. Manikantha Dunna, Dr. Patrick Reynolds

1pm **Modeling the Effects of Acute Inflammation on Endothelial Barrier Function from PDMS-based Brain Microvessels**
» Leila Martinez, Ruoqian Hu, Dr. Ying Zheng

1:15pm **Influence of Phytochemicals Present in Mint Extract in Preventing Oxidative Stress in Human Serum Albumin**
» Ms. Perla Tovar, Ms. Nkeiruka Aziekwu, Ms. Grace Murray, Ms. Tess Corbett, Bidisha Sengupta

1:30pm **Investigation on Therapeutic Potentials of some Polypeptides for Type-II Diabetes using Computational Approach**
» Nicolas Campos

1:45pm **Covalently Modifying Hepatocytes with Carbamate Bioconjugates**
» Johann Karunananthan, Elena McGown, Prof. Bob Kane

2pm **A Double-Blind, Placebo-Controlled Study on Probiotic Treatment for Halitosis**
» Sehyeon Song, Jihye Choi, Min Ji Jang, Dr. Md Ariful Haque, Dr. Jin Seok Moon, Dr. Keon Heo, Dr. Myeong Soo Park, Prof. Seockmo Ku

2:15pm **Evaluating the Water Quality of Treated Wastewater from Deep East Texas Wastewater Treatment Plants Using Microbial Biofilm**
» Ms. Olabisi Ogunlewe, Bidisha Sengupta

12:30pm (S5) Systematics & Evolutionary Biology

MAC 300 @ MCC
Chaired by: Thornton Larson and Matthew J. Greenwold

12:30pm **Brood pouch anatomy throughout the course of male pregnancy in Gulf pipefish**
» Farah Atatrah, Dr. Sunny Scobell

12:45pm **Characterization of a Potential New Species of the Wildflower Genus Anemone**
» Ms. Kricket Tolbert, Dr. Russell Pfau

1pm **Determining species boundaries in the springsnail Pyrgulopsis (Mollusca, Gastropoda, Hydrobiidae).**
» Dr. Kathryn Perez, Mr. Trenton Meadows, Ms. Chante Lundskog, Mr. Eric Miskow

1:15pm **Divergent gene expression between the eyes of surface and subterranean salamander species from central Texas (clade Paedomolge) through development**
» Ruben U. Tovar, Brittany A. Dobbins, Dr. Rebecca L. Young, Dr. Katherine Bockrath, Dr. Thomas J. Devitt, Dana M. García, David M. Hillis

Continued from **Friday, 28 February**

1:30pm **Exploring the morphology, geography and phylogeny of a family of Blindsnakes (Anomalepididae: Serpentes)**
» Mr. Camilo Linares, Christopher Bell, Dr. Claudia Koch, Dr. Matthew Heinicke, Dr. Hussam Zaher, Dr. Juan D. Daza

1:45pm **Hiding in plain sight: a commonly observed and widely distributed new species of wolf spider**
» Dr. Russell Pfau, Eric Neubauer

2pm **Investigating male pregnancy in Gulf Pipefish using scanning electron microscopy to describe the anatomy of the brood pouch over the reproductive cycle.**
» Ms. Jennifer Schmalz, Dr. Deanna Soper, Dr. Sunny Scobell

2:15pm **Investigation of the role of prolactin during reproduction in a fish with male pregnancy**
» Dr. Sunny Scobell

2:30pm **Use of ddRAD sequencing to diagnose cryptic species with low interspecific mitochondrial divergence**
» Halle Summers, Dr. Loren Ammerman

2:30pm **Biomedical Sciences Section Meeting**
MAC 200 @ MCC

2:30pm **(S4) Coffee Break**
MAC 1st 2nd & 3rd floor lobbies

2:45pm **Freshwater Science Section Meeting**
MAC 237 @ MCC

2:45pm **Systematics & Evolutionary Biology Session Meeting**
MAC 305 @ MCC

2:45pm **(S3) Coffee Break**
MAC 1st 2nd & 3rd floor lobbies

2:45pm **(S5) Coffee Break**
MAC 1st 2nd & 3rd floor lobbies

3pm **(S1) Coffee Break**
MAC 1st 2nd & 3rd floor lobbies

3pm **(S4) Cell & Molecular Biology**
Lecture Hall @ MCC
Chaired by: Adriana Visbal and Dr. Craig Younce

3pm **Visualising Liquid-Liquid Phase Separation of Intrinsically Disordered Proteins**
» Cas Knox, Oliver Kipp, Dr. Steven Whitten, Lance English

3:15pm **A Positive Control Let Us Make the RecA+ Strain**
» Dylan Dodd, Dr. Matthew Dyson

3:30pm **Delineation of in vitro and in vivo Oxysterol-modified RNA Adducts by Distinct TLC Spots**
» Ms. Abby Sweeney, Ms. Adaeze Ozuzu, Dr. Craig Younce, Dr. Godwin Ifere

3:45pm **Screening Compounds for Their Anti-Cell Proliferation Properties**
» Tina Prajapati, Dr. Rachna Sadana

Continued from **Friday, 28 February**

4pm **An easy and comprehensive protocol for microinjection into zebrafish (Danio rerio) and medaka (Oryzias latipes) eggs to study gene function**
» Ms. Alicia Mendoza, Ms. Isabella Simon, Dr. Sharmin Hasan

4:15pm **Making decisions: does mitochondrial metabolism influence retinogenesis?**
» Yaqueline Gutierrez, Yessenia Beltran, Emilia Santamaria, Elda Rueda

4:30pm **Measuring the Effects of Aerosol Exposure: Dose-Response Dynamics and Potential Outcomes**
» Ms. Taylor Jefferis, Dinny Stevens, Kiera Griffin, Yanira Baldovinos, Christie Sayes

4:45pm **Every amino acid matters, but some matter more: insights from population-wide histone missense mutation landscape**
» Dustin Fetch, Tiffany Bastos, Natalie Redding, Ksenia Dydo, Gauri Raje, Dr. Alexey Soshnev

5pm **Functional study of profilins using a vertebrate model**
» Samira Alam, Andre Gil, Leslie Mendez, Dr. Sharmin Hasan

5:15pm **Orco and IR8a co-receptor knockout leads to dis-regulation of tuning receptors and other chemosensory genes in Aedes aegypti**
» Mr. Matthew Cooke, Dr. Jason Pitts, Mr. Michael Chembars

5:30pm **Bioinformatic analysis of COX 1 and COX 2 proteins**
» Mr. Jerry Leisure

3:15pm **STEM Education Section Meeting**
MAC 205 @ MCC

3:15pm **(S1) Chemistry & Biochemistry B**
MAC 111 @ MCC
Chaired by: Darrell Fry and Bidisha Sengupta

3:15pm **In vitro studies on ethanolic extracts of Watercress leaves using spectroscopic and cell viability assays.**
» Bidisha Sengupta, Dr. Debarshi Roy

3:30pm **Innovative Biologically Equivalent Simulant for Forensic Tracedrop (BEST) for Enhanced Criminal Scene Reconstruction**
» Jingbo Liu, Maria Sandoval, Emily Rancourt, Sajid Liu

3:45pm **Investigation of itinerant kagomé-lattice magnets, ZrFe6–xCoxGe6**
» Eduarda Stein Christ, Victoria Li, Dr. Michael Shatruk

4pm **Lanthanide alkali metal sulfates, MLn(SO□)□(H□O)□, viable candidates for nuclear waste matrices?**
» Dr. Ralph Zehnder

4:15pm **Mechanistic Analyses of DNA Lesion Recognition and Repair in the Eukaryotic Global Genome Nucleotide Excision Repair**
» Ms. Temilade R. Adeniran, Ms. Linh Pham, Prof. Kenji Murakami, Dr. Jung-Hyun Min

4:30pm **Microplastics in Wastewater Treatment Plants of Deep East Texas**
» Mr. Jacob Swallow, Dr. Kefa Onchoke

4:45pm **Microwave Graphitization of Biochar Catalyzed by Ferric Nitrate**
» Ms. Jessica Villarreal

5pm **NO RADIOACTIVITY REQUIRED! A new approach to RecA-mediated DNA strand exchange**
» Haley Fossett, Dr. Robert Moore

5:15pm **N-Sulfonylation of Carbamates Under Mild Conditions**
» Ms. Claire Slort, Rahul Gaykar, Prof. Bob Kane

5:30pm **Organic Synthesis of Norneolambertellin**
» Mr. Nick Welch, Mr. Cody Dubes

3:15pm **(S2) Coffee Break**
MAC 1st 2nd & 3rd floor lobbies

Continued from **Friday, 28 February**

3:15pm **(S3) Marine Science**
MAC 235 @ MCC
Chaired by: Madelyn Knauss and Ms. Jennifer Hunt

3:15pm **Impact of Topology on Coral Larvae Settlement on Concrete Matrices**
» Ms. Jennifer Hunt, Brian Flowers, Dr. Thomas Ready

3:30pm **Longitudinal Study of White Band Disease in Acropora species in Roatán, Honduras**
» Ethan Villa, Deandre Rosales, Kylee Steiger, Stephanie Randell, Dr. Stephanie Lockwood, Dr. Traesha Robertson, Dr. Jacqueline Dove

3:45pm **LONGITUDINAL STUDY OF WHITE BAND DISEASE IN ACROPORA SPECIES IN ROATÁN, HONDURAS**
» Ethan Villa, Deandre Rosales, Kylee Steiger, Dr. Jacqueline Dove, Dr. Traesha Robertson, Dr. Stephanie Lockwood, Stephanie Randell

4pm **A Longitudinal Study: The Abundance and Disease Status of Starlet Corals in Roatán, Honduras**
» Gloria Dominguez, Kaylee Aguilar, Leon Rosales, Annie Mowry, Stephanie Randell, Dr. Stephanie Lockwood, Dr. Traesha Robertson, Jacqueline Dove

4:15pm **Effects of Hyposalinity and Nutrients on the GPP of Gracilaria tikvahiae**
» Mr. Donavuan Salazar

3:45pm **(S2) Anthropology**
MAC 206 @ MCC
Chaired by: Stephanie Baker and Theresa de Cree

3:45pm **Optimizing Skeletal Cast Resources: Developing Standardized Maintenance Protocols for Enhanced Osteology Study at Texas State University**
» Ms. Nathalia Garza, Ms. Stephanie Baker

4pm **Anthropology Section Meeting**
MAC 205 @ MCC

4pm **(S2) Geosciences**
MAC 206 @ MCC
Chaired by: Dr. Michael Read and Dr. Mindy Faulkner

4pm **Broader implications of the challenges associated with building a field guide to the macroscopic invertebrate fossils of the lower Walnut Formation in Travis County, Texas**
» Stacie Skwarcan, Christopher Bell

4:15pm **The physics of sandcastles: Jammed granular columns with and without fluid**
» Dr. Jeffrey Olafsen, Dr. Oliver-Denzil Taylor, Dr. Mihan McKenna Taylor

4:30pm **Rill marks on the beach face at McFaddin National Wildlife Refuge, Texas**
» Prof. R. LaRell Nielson

4:45pm **Searching for the K-Pg Iridium Anomaly in Central Arkansas**
» Dr. Mindy Faulkner, Ms. Rebecca Beyer

4:30pm **Marine Science Section Meeting**
MAC 237 @ MCC

5:30pm **Geosciences Section Meeting**
MAC 205 @ MCC

5:45pm **Cell & Molecular Biology Section Meeting**
MAC 200 @ MCC

Continued from **Friday, 28 February**

5:45pm **Poster Session**
Science Building Lobby @ MCC

Early-Life Medication Exposure: Unraveling the Gut Microbiome's Role in Neurodevelopmental Disorder Risk
» Ms. riya palanki

Pulmonary Endothelial Cell Proliferation in Response to HIV Nef Sequence Variants
» Eli Heath, Minh Nguyen, Mario Rodriguez, Amanda Garcia, Javaria Baig, Dr. Sharilyn Almodovar

Memristors: The Elusive Circuit Component
» Mr. Vance Vyoral, Prof. Derek Johnston

Identification of Novel Transcripts of the Obesity Related, Nepl15 Gene found in Drosophila melanogaster
» Chase Drucker, Dr. Surya Banerjee

Evaluating the Adipogenic Effects of Bisphenol S on OP9 Mouse Cells
» Ms. Hailee McCulloch, Ms. Lizbeth Campos, Dr. Stephanie Perez, Dr. Danielle Grove

The Effects of Dimethyl Terephthalate on Adipogenesis in an OP9 Mouse Cell Model
» Sophie Salgado, Eric Moninger, Dr. Stephanie Perez, Dr. Danielle Grove

Screening TZ62, TZ70, and TZ71 for Inhibition of Metastasis
» Mr. Maximiliano Perez, Dr. Rachna Sadana, Dr. Vaishali Chaubal

An Experimental Algorithm Analysis for Die Configurations
» Ms. Mary Heeren, Dr. Jeremy Becnel

The effects of driving under the influence of cannabis, a meta-analysis.
» Om Tannu

Infection sites do not affect virulence factors or biofilm formation by Pseudomonas aeruginosa
» Mr. Eltayeb Diab

Synthesis of Substituted Indoles and Imidazopyridines Through N-Alkynyl Imidazoles
» Mr. Gabriel Martinez, Dr. Mohanna Muppidi, Dr. Sean Kerwin

A morphological analysis of the dopaminergic pathway in the brain of a male-pregnant pipefish
» Ms. Madeleine Thomas, Dr. Sunny Scobell

The Impact of Obesity on Femoral Cortical Bone Size and Shape
» Alanna Melchor, ChristiAna Dunham, Dr. Deborah Cunningham, Daniel Wescott

A critical analysis of the bent-hip/bent-knee locomotor hypothesis for Australopithecus afarensis
» Ms. Jayci Bonnette, Dr. Adam Sylvester, Dr. Deborah Cunningham

Ivermectin induces apoptosis on HEC-1A endometrial carcinoma cells
» Ms. Jaitlynn Sherman, Dr. Matthew Dyson

Vertebral Canal Constriction: Exploring the Link Between Vertebral Neural Canal Size and Early Mortality
» Ms. Kelsey Fox, Dr. Michelle Hamilton

Enhancing Belonging for Underrepresented Students through Student-Designed Learning Field Experiences
» Dr. Brian Shmaefsky

Continued from **Friday, 28 February**

A mitochondrial based intervention for Mild Cognitive Impairment (MCI) using photobiomodulation, methylene blue, and medium chain triglycerides
» Mr. Hunter Dutkiewicz, Mr. Jordan Schwartz, Dr. Francisco Gonzalez-Lima, Dr. Douglas Barrett, Dr. Gabriela Guimaraes, Isabelle Rose

Evaluation of microplastic uptake by Asian clams in isolated pools within an ephemeral stream in Central Texas
» Ananya Seth, Dr. Jeffrey Hutchinson

Laser Synthesis of Mixed Metal Spinel Materials for the Oxidation Reduction Reaction
» Mx. Mal Millholland, Mr. Andres Garza, Mx. Makena Burns, Dr. Ben Martin

Modeling the optimal growth of gravitropic respondent Solanum pimpinellifolium root systems
» Aaron Garza, Prof. Arjun Chandrasekhar

Comparative mitogenome analysis of Procambarus crayfish species.
» Matthew Blow, Matthew J. Greenwold

Determining intra-genomic variation of Cladosporium velox: considerations for aerobiology fungal metagenomics
» Ms. Elise Berryhill, Dr. Josh McLoud

Facilitating Archaeological Research Through the Veterans Curation Program
» Alanna Melchor, James Moore, Darrell Anderson

Diet of the Great Horned Owl (Bubo virginianus) in a Chicago suburb
» Dr. Timothy Campbell, Ms. Jasmine Zhai, Ms. Ashley Lanzarotti, Mr. Alexander Delgado, Dr. Samuel Gutherz

Computational Analysis of the Hydrolytic Stability of Heteroboroles by Varying the Number of Water Molecules
» Mr. Gallage KPA Ariyaratne, Prof. Dustin Gross

Parking Predicament: A Microeconomic Analysis of Tech's Parking Shortage
» Mr. Affan Anas, Dr. Victoria Hang, Mr. James Kemper, Dr. Latchezar Popov, Mrs. Patricia Schovanec

Effects of Chinnaberry on Foraging of Gulf Coast Toads (Incilius nebulifer)
» Marion Mundy, Amy Lowe, Dr. Chris Distel

The Little Chamaeleon That Could
» Adelle Cannon, Dr. Juan D. Daza

Progress on Saurodactylus (Squamata: Gekkota: Sphaerodactylidae) classification: One or two genera
» Ms. Jayden Crew, Christopher Bell, Dr. Aaron Bauer, Dr. Juan D. Daza

Lose the Lichen: The Use of Photogrammetry in Epigraphic Documentation
» Aliyah Anderson, Dr. Nick Carter, Dr. Barb MacLeod, Jake Lozano

PAX6 colocalizes with actin filaments in hair cells
» Nisa Sindhi, Brittany A. Dobbins, Ruben U. Tovar, David M. Hillis, Dr. Thomas J. Devitt, Dana M. García

Gene Editing: A New Way to Treat Breast Cancer
» Ms. Cheyenne Willis

Predator Prey Simulation
» Dr. Jeremy Becnel, Mr. Brenden Swope

A Novel Machine Learning Approach for Predicting Evolutionary Stages of Stars
» Mr. Hitaishi Chillara

Continued from **Friday, 28 February**

Getting a(head) of ourselves: Ectopic head formation following nerve injury in Lumbriculus variegatus.
» Isabella Ortiz, Jake Garza, Dr. Veronica Martinez Acosta

Comparative Analysis of Molecular Impacts of Short-Chain PFAS Exposure on ABCG2 Transporter in Human Cell Models
» Gracen Collier, Dr. Ramon Lavado

Determining the Effect of Connectivity on Community Composition of Pollinators Through Pollen Metabarcoding
» Erin Miller

Interfaith Informatics
» Yordanos Ayelework, Dr. Aravind Mohan

Discovering Novel Inhibitors for 3-Oxoacyl-ACP-Reductase (FabG) in Plasmodium falciparum Using Virtual Screening
» Mahdia Rahman, Hannah Thomas, Dr. Josh T. Beckham

Phenotypic Analysis of Allopatric B. subtilis Strains
» Nichole Cepeda, Dr. Robert Jonas

Distortion of Single Transferable Vote on a Line
» Ms. Camille James, Dr. Barbara Anthony

Novel Sexy Role of Prolactin in Regulating EMT of Breast Cancer Through CD44 Splicing
» Ms. Reagan Farrell, Mr. Trevor Jones, Mr. Nicholas Pascuzzi, Dr. Ethan Chen

Upcycling Orange Peels for Sustainable Monascus Pigment Production
» Ian Konvicka, Dr. Md Ariful Haque, Prof. Seockmo Ku

Evaluating Diatom-Based Carbon Filtration for Emission Reduction in Controlled Environments
» Mr. Ethan Yager, Dr. Athenia Oldham

Acetate Formation from Various Alkenes: An Undergraduate Addition Reaction Laboratory
» Ms. Saira Sitgreaves, Mr. Benjamin Wisser, Dr. Bruce Hathaway, Dr. Scott Morris

Comparative Mitogenome Analysis of True Toads (G: Anaxyrus)
» Ciara E. Moroney, Dr. William I. Lutterschmidt, Matthew J. Greenwold

Synthesis of Methotrexate loaded Poly L-lactic acid combined with a hydrogel for treatment of Rheumatoid Arthritis
» Areej Khodair, Dr. Milka Montes

Minimizing Citrinin in Monascus purpureus Fermentation
» Khadija Ayesha, Lakshmi Devi Chittepu, Dr. Md Ariful Haque, Prof. Seockmo Ku

Using Thermal Imaging to Investigate Differences between Body Temperature and Surrounding Microhabitat Temperature in a Free-ranging Ectotherm
» Dr. William I. Lutterschmidt, Ms. Jenna Brue

Microbial and Saccharification Dynamics in Developing Sustainable Sorghum Makgeolli
» Marianne Howell, Elizabeth Campbell, Min Ji Jang, Dr. Md Ariful Haque, Prof. Samuel Haruna, Prof. Seockmo Ku

Investigating Carbon Source Effects on Fungal Cellulose Production from Red Yeast Rice
» Paulina Sandoval, Anishka Talari, Dr. Md Ariful Haque, Prof. Seockmo Ku

Microbial Dynamics and Probiotic Potential of Lactic Acid Bacteria in Traditional Korean Makgeolli
» Yu Jeong So, Min Ji Jang, Prof. Seockmo Ku, Yunju Jeong

Continued from **Friday, 28 February**

Adding worms to an aquaponic system: Impacts on plant growth
» Ms. Alice Conely, Dr. Matthew Allen

Cellular Uptake and Cytotoxicity of Micro and Nanoplastics
» Mrs. Alisha Janiga-MacNelly, Dr. Tham Hoang, Dr. Ramon Lavado

Effects of Temperature on the Fecundity of Secondary Cavity Nesters at the University of Texas at Tyler
» Gwendolyn J. Bouse, Jessica L. Coleman, Matthew J. Greenwold

Structural properties of lanthanide alkali metal sulfates, MLn(SO4)2(H2O)X
» Thomas Hodge, Jackson Turner, Dr. Ralph Zehnder

A lanthanum glutarate bromoterephthalate compound with unique structural properties
» William Best, Emory Brandon, Daniel Rios, Dr. Ralph Zehnder

Macroorganism Associations and Health Status of Demospongiae Species in Roatán, Honduras
» Ms. Cambria Blanton, Caden Helona, Naomi Hammond, Ashlynn Kennedy, Dr. Jacqueline Dove, Anne Mowry, Dr. Traesha Robertson, Stephanie Randell, Dr. Stephanie Lockwood

Liver Morphology in Gliding and Non-Gliding Geckos
» Lynsey Haynes, Dr. Juan D. Daza

Investigating Fermentation and Probiotic Properties of American Kimchi with 100% U.S.-Grown Crops
» Sehyeon Song, Maddie Shults, Min Ji Jang, Prof. Seockmo Ku

Zoonotic Risks in Tourist Hotspots: The Critical Need for Education on Safe Human-Animal Interactions
» Elea Vander Burgh

Flavonoid's Influence on Amyloid Beta Peptide Aggregation
» Mrs. Imani Harris, Dr. Robert Friedfeld, Bidisha Sengupta

Egg size variation in Carolina Wren clutches
» Ms. Kendra Rodrigue, Mr. Stefano Cavezza, Dr. Diane Neudorf

Comparative Analysis of Food-Induced Aggression in Drosophila Species with Varying Dietary Preferences
» Mrs. Laurie Neuman, Dainet Arencibia, Juan Magadan, Tammy Duong, Yuan Yuan Kang

Experimental test of predator odor detection in a cavity-nesting songbird
» Anna Maloney, Kendall Kinsey, Dr. Diane Neudorf

Plankton Communities of Coastal Habitats in Roatan, Honduras
» Aero Warren, Harrison Wolf, Annie Mowry, Dr. Traesha Robertson, Dr. Stephanie Lockwood, Dr. Jacqueline Dove, Stephanie Randell

Development of Modified Media for Enhanced Fungal Cellulose Production
» Gianmarco Frau, Dr. Md Ariful Haque, Lakshmi Devi Chittepu, Anishka Talari, Prof. Seockmo Ku

Floral Diversity and Function in the Upper Leon Creek Greenway
» Ms. Annie D'Arcy, Dr. Jeffrey Hutchinson

Using lichens as bioindicators for analyzing air quality in Central Texas
» Mr. Jack Luckey, Prof. Chad Cryer

Biodiversity Assessment of Vertebrates in Runnels County, Texas
» Maya Morrell, Makayla Easley

Developing an In Vivo Screening Protocol for Proteins Predicted to Phase-Separate
» Kaylie Cano, Sebastián Vélez Guzmán, Dr. Steven T. Whitten, Dr. Loren E. Hough, Dr. Karen A. Lewis

Continued from **Friday, 28 February**

Development and Validation of an Analytical Method for the Determination of Minor and Trace Metals in Water by ICP-OES
» Ms. Layla Jackson, Dr. Alakananda Chaudhuri

Assessing the effects of early life maternal separation stress on adolescent behavior and hypothalamic-pituitary-adrenal axis function in male and female C57BL/6J mice
» Grace Read, Caroline Fowler, Dr. Elisabeth Vichaya

Desmoinesian (Middle Pennsylvanian) fusulinids from Holman Hill, Mora County, New Mexico
» Ariana Rodriguez, Dr. Michael Read

Detection of non-native freshwater jellyfish Craspedacusta sowerbii in central Texas using environmental DNA
» Vera Ye, Morgan Jennison, Kaitlin Plate, Dr. Matthew A. Barnes

Microfragmentation method alters growth in the endangered stony coral Acropora palmata
» Dr. Deanna Soper, Ms. Maria Cordero, Ms. Nora Aigberadion, Ms. Monique Bedolla, Mr. Jason Spadaro, Mr. Ian Combs, Mrs. Keiyi Okamura, Mrs. Makayla stewart, Mrs. Sarah Hamlyn, Mr. Lou Schlecker

Preliminary Data on the Influence of Habitat Type and Environmental Variables on Fish Community Dynamics in Harmon Creek, Texas
» Erica Hagmeyer, Dr. Jeffrey R. Wozniak

Coefficient of restitution of two colliding particles in experiment and simulation
» Dr. Jeffrey Olafsen, Dr. Kai Yang

Indole Variant-Specific Effects on Fusobacterium nucleatum Invasion and Barrier Function in Intestinal Epithelial Cells
» Ms. Jessalyn Hawkins, Mr. Colin Scano, Mr. Gregory Zaharas, Dr. Leigh Greathouse

Comparative Analysis of Varroa Mite Infestation in Managed Bee Populations in Williamson County, Texas
» Mr. Ramiro Collado Irizarry, Prof. Chad Cryer

You Better Belize They're Different: Phylogenetic analysis and species identification of native apple snails in Belize
» Mr. Gage Mallo, Mr. Johun Reyes, Dr. Romi Burks

Characterization of BRCA1/2 Variants in Latinas Using Genomic Prediction Tools: A Study from NIH All of Us Research Program
» Eunice Pelcastre Villanueva, Dr. Catherine Gavile, Dr. Erick Olivares, Dr. Cathy Samayoa, Adriana Visbal

Minimally invasive measurement of zonulin, a key biomarker for environmental enteric dysfunction and childhood growth faltering, in dried blood spot samples
» Luna Orozco, Elizabeth Kim, Emma Shoemaker, Laila Fahed, Tomasz Nowak, Dr. Samuel Urlacher, Dr. Michael Muehlenbein

Simulating the Minimum Number of People Needed for an Interstellar Journey
» Mr. Dominic Mashak, Dr. Steven Alexander

Using Molecules to Store Energy
» Mr. Dante Medina, Dr. Steven Alexander

Evidence of aging recovery on germination rate of admixed genotypes of Arabidopsis thaliana
» Syeda MTI Sanzara, Dr. Kattia Palacio-Lopez

How does exposure to drought and high-temperature conditions affect the development of Arabidopsis thaliana?
» Laura D'luyz Pastor, Syeda Sanzara, Yoselin Sanchez, Dr. Kattia Palacio-Lopez

Arabidopsis thaliana Fitness and Resource Allocation While in an Interspecific Competition with Lolium multiflorum.
» Daniel Medina, Kassandra Orellana, Dr. Kattia Palacio-Lopez

Continued from **Friday, 28 February**

Photonegative behaviors of polychaete worms
» Mr. Ian Gafford

Shoot for the Moon An In-depth discussion of child engagement in STEM
» Ms. RosAaliyah Olguin

Assessing Thermal Tolerance in Guinea and Johnson Grasses Using Chlorophyll Fluorescence as an Indicator of Plant Damage
» Mr. Arvin Allahyari

A Coumarin-enamine derivatized Chemosensor for Relay recognition
» Marlene Zepeta-Rodriguez

Fluorescence Microscopy Analysis of Microplastic Interactions with Microorganisms
» Nolan Godfrey

A Preliminary Summary for the Thermal Profiles of Microhabitats within Bastrop State Park: Helping to Inform Occupancy Models for the Houston Toad
» Peter Babcock, Dr. William I. Lutterschmidt, Paul Crump, Toby J. Hibbitts, Wade A. Ryberg, Danielle K. Walkup, Corey Fielder, Brandon C. Bowers

Osteological Comparison of the Houston Toad with other selected members of the family Bufonidae
» Lauren N. Scherrer, Dr. Juan D. Daza, Dr. William I. Lutterschmidt

Arachnid Species in Callahan County
» Jacob Wooten, Dr. Terrence Boyle

Rill marks on the beach face at McFaddin National Wildlife Refuge, Texas
» Prof. R. LaRell Nielson

Comparative Medium to Large Mammal Diversity Within the Crosstimbers of Central Callahan County Texas
» Melinda Siebert, Prof. Joel Brant

Effects of age and health of deer on nasal bot fly counts in white-tailed deer
» Evee Rasor, Julia Galvan, Prof. Chad Cryer

MiR-23a as a potential post-transcriptional regulator of KDM6A and CTCF protein expression in EMT
» Ms. Emily York, Dr. Joseph Taube

Developing a paleontological database for the fossil collection in the Department of Earth Sciences and Geologic Resources at Stephen F. Austin State University
» Kandace Muniz, Dr. Michael Read, Prof. R. LaRell Nielson

The impact of market integration on school-age children's gut microbiota and growth among the Amazonian Shuar
» Emma Shoemaker, Fernanda Miron, Dr. Samuel Urlacher

"Vocalization Signatures of Frog Species: A Study of Call Patterns for Species Identification and Biodiversity Monitoring in a Temperate Wetland Ecosystem"
» Sunshyne Gwinn, Prof. Joel Brant

A Comparison of Rural and Urban Bird Communities in the Big Country
» Caleb Dale, Prof. Joel Brant

Extraordinary extraction efforts: Experiments to enhance DNA extraction for tissues of apple snails of conservation interest
» Kylie Allemeier, Katelin Pilarski, Rachel Ling, Sarah Berver, Dr. Romi Burks

Potential Disruptors of the Acoustic Habitat of Carolina Wrens and The Implications For Reproductive Isolation
» Zachary Seidel, Dr. Diane Neudorf

Continued from **Friday, 28 February**

Rodent Habitat Selection in Three Counties (Callahan, Coleman, and Taylor) in Texas
» Ansynn Franklin, Prof. Joel Brant

Characterization of the Smackover Formation in Upshur County, Texas using core and geochemical data
» Eric Browning, Dr. Julie Bloxson

UV-vis spectrophotometry for kinetic study of the Dushman reaction
» Ms. Lily Sowell, Dr. Byron Rogers

PAX6 in Salamander Inner Ear: A Developmental and Comparative Study
» Ms. Kimia Feiz, Brittany A. Dobbins, Ruben U. Tovar, Dr. Thomas J. Devitt, David M. Hillis, Dana M. García

Varroa mite prevalence feral Central Texas bee colonies
» Caleb Bell, Prof. Chad Cryer

Indole Variant-Specific Effects on Fusobacterium Nucleatum Biofilm Growth, Virulence Expression, and Invasion of Intestinal Epithelial Cells
» Mr. Gregory Zaharas, Ms. Jessalyn Hawkins, Mr. Colin Scano, Dr. Leigh Greathouse

The importance of canopy width and connectivity for biodiversity in urban riparian habitats
» Maya Flores, Prof. Thomas Garrison, Dr. Mary Poteet

Effects of Angiotensin II in the Development of Atherosclerosis/Atherothrombosis
» Ms. Kennya Gomez

Examining the Effects of the ApoE4 Genotype on Hyperglycemia-Induced Affective and Mitochondrial Dysfunction in Male Mice
» Mr. Matthew Folh, Mr. Jonathan Duhon, Ms. Laura Kusumo, Dr. Elisabeth Vichaya

Development of oxonol fluorogenic probe for hydrogen peroxide detection in-vitro
» Mr. Biakengzaua Khupngai, Mr. MOHAN KODISANA, Dr. Syed Usama

Viscosity-Sensitive Cy3 Fluorophores for Cell Membrane Labeling
» Mr. MOHAN KODISANA, Dr. Syed Usama

Skeletal morphology of Tetracheilostoma Carla (Typhlopidae, Serpentes, Squamata), the world's smallest snake
» Mr. Caleb Shoemaker, Dr. Juan D. Daza

Bone fracture trends in elderly individuals with arthroplasty
» Theresa de Cree

Ecological Niche Modeling of selected West Coast Angiosperms
» Mason Scott, Ms. Samantha Hamilton

Early-Life Communication at Critical Developmental Timepoints Among NS-PTEN Mice
» Ms. Taylor Bradish, Mr. Gautham Chelliah, Ms. Chloe Lau, Mr. Colton Kelley, Mr. Joshua Thayil, Mr. Joaquin Lugo, Ms. Katherine Blandin, Dr. David Narvaiz, Dr. Joaquin Lugo

Investigating the Effects of the ApoE4 Genotype on Hyperglycemia-Induced Depressive Like Behavior and Neuroinflammation in Female Mice
» Mr. Jonathan Duhon, Mr. Matthew Folh, Ms. Laura Kusumo, Dr. Elisabeth Vichaya

Exploring the Potential of Novel 2D Transition Metal Compounds (2DTMCs) for Advanced Energy and Catalytic Applications: A Computational Study on Stability and Electronic Properties
» Puja Rijal, Dr. Uvin Dealwis, Dr. Kevin Shuford

Continued from **Friday, 28 February**

Synthesis and Computational Analysis of Diazaborolidines Derived from Phenylboronic Acid Derivatives and 1,2- and 1,3-diamines
» Mr. Ravindu Pathirana Hewage, Prof. Dustin Gross

Variations in Assignment Expectations as Represented by Rubric Structure and Content in General Chemistry
» Ms. Chloe Sells, Dr. Michelle Herridge

Improving CKKS Performance with Vector Computation and GPU Acceleration
» Smaran Manchala

Investigating Neuroinflammatory and Behavioral Outcomes of MOC2-7 Tumors in Male C57BL6/J Mice: Absence of Depressive-Like Phenotype with Evidence of Fatigue and Cachexia
» Avery Gillett, Caroline Fowler, Dr. Cory Dungan, Dr. Elisabeth Vichaya

Investigating the long-term effects of pifithrin-μ on cisplatin-induced cognitive impairment
» Mia Tarantino, Caroline Fowler, Valeria Muniz, Mathew Chatham, Tanish Raina, Dr. Elisabeth Vichaya

Transcranial Photobiomodulation (tPBM) Reduces Anxiety Symptoms and Improves Attentional Control
» Mr. Kevin Thakkar, Mr. Anagh Mirji, Laura Gamboa, Dr. Roger Davis, Dr. Francisco Gonzalez-Lima

The impacts of diel thermal variability on zebra mussel survivorship at the upper limit of their tolerance: linking laboratory results to natural field conditions in Texas
» Chase Herrington, Cadence Sen, Amya McCarroll, Dr. Jason Locklin

Temperature-induced stress and the starvation of zebra mussels (Dreissena polymorpha) in a Central Texas Lake
» Cadence Sen, Amya McCarroll, Chase Herrington, Dr. Jason Locklin

Bacteria Growth in Schools
» Carlie Buck

Empowering sciences student transfers: Identifying and addressing transfer rate disparities in a Central Texas community college
» Trinity Vig, Sariah Kaipat, Dr. Jason Locklin

The Effect of Reporting Bias on the Opioid Crisis: What You Don't Know CAN Hurt You
» Katy Garmon, Dr. Kendall Hammonds, Dr. Emily Garmon

Effects of location and time of hunting season on nasal bot fly counts in white-tailed deer
» Julia Galvan, Evee Rasor, Prof. Chad Cryer

Large-scale natural and anthropogenic environmental variables associated with Rio Grande chirping frog distribution in Central Texas
» Kamille Marry, Jeff R. Troy, Clark D. Jones

Completing a Fossil of a 99 Million Year Old Squamate from Myanmar Using 3D Modeling
» Lilly Nguyen, Elizabeth Kull, Dr. Juan D. Daza

Environmental factors affecting the antioxidant properties and phenolic content of green and purple basil
» Myla Benally, Luke Ford, Andrea Armeriv, Teresa Bilinski, Emily Niemeyer

Investigating the antidepressant effects of dimethyl fumarate in a murine model of diabetes
» Ms. Madilyn Johnson, Ms. Laura Kusumo, Mr. Reece Bonner, Ms. Kaylea Gawf, Dr. Elisabeth Vichaya

Cranial Anatomy of the Australian Western Beaked Gecko (Rhynchoedura omata: Diplodactylidae: Gekkota) in 3D
» Andrew Rock, Samira Alam, Tanya Duran, Sofiane Gana, Elyse Howerton, Mr. Camilo Linares, Amber Reynolds, Elizabeth Saxton, Dr. Aaron Bauer, Dr. Juan D. Daza

Continued from **Friday, 28 February**

Exploring Emotional Development through Physiological, Behavioral, and Contextual Factors
» Ms. Nicole Jackson, Dr. Yelim Hong, Ms. Megan Klinginsmith, Dr. Laura Quinones Camacho

Investigating chloroplast DNA diversity within populations of Mentzelia thompsonii
» Gisela Guerrero, Darren Pratt, Nadia Tuggle, Kiley Frost, Kyuyeon Kim, Alexis Tuyo, Joshua Brokaw

Travel or Treat?: An Analysis of Spider and Howler Monkey Prehensile Tail Use
» Ms. Lydia Lehman, Dr. Jill Pruetz

Understanding the Correlation Between Cardiovascular Disease and Major Depressive Disorder: The Role of Common Biomarkers
» Kylee Adkinson, Macie Berry, Dr. Katherine Sanchez, Dr. Karel Kalecký

Influence of the hyporheic zone on gene flow in invertebrates in the Edwards-Trinity Aquifer, Texas.
» Mr. Evan Guerrero, Dr. Kathryn Perez, Dr. Benjamin Hutchins, Dr. Benjamin Schwartz

Initial Characterization of Unique Mice Fibroblasts Populations
» Megan Hicks, Dr. James Harper

Mitochondrial structure is altered before muscle wasting during tumor induced cachexia
» Ms. Kenia Grimaldo, Sofiane Gana, Mrs. Mardelle Atkins

Early Life Stress in Fmr1 Knockout Mice Reduces Body Weight Acutely, But Minimally Alters the Behavioral Manifestation
» Ms. Katherine Blandin, Ms. Taylor Bradish, Mr. David Narvaiz, Mr. Joshua Thayil, Ms. Chloe Lau, Ms. Diuto Enyeribe, Ms. Maria Hemmerseier, Ms. Kendall Lally, Mr. Joaquin Lugo, Dr. Joaquin Lugo

Variations in antioxidant properties and phenolic content within cultivars of Monarda herbs
» Mattigan Aga, Alexis Flores, Holly Lawson, Emily Niemeyer

Exploring the phenolic composition of Monarda herbs: Influence of seed source and cultivar
» Alexis Flores, Mattigan Aga, Holly Lawson, Emily Niemeyer

Studying the Effectiveness of Chlorine Treatment in Wastewater using Microbial Biofilm
» Mr. Philip Baker, Ms. Cephus Bess-Grunewald, Ms. Olabisi Ogunlewe, Bidisha Sengupta

Identification of Affibody Molecules that Target Phospholipase A2
» Ms. Kechcheng Sreang, Ms. Grace Youngblood, Dr. Edith Osborne, Ms. Kelyia Estell

The Consequences on Neuroinflammation Following Neonatal Status Epilepticus in C57BL/6J Mice
» Mr. Joshua Thayil, Ms. Taylor Bradish, Mr. David Narvaiz, Katherine Blandin, Reagan Yarborough, Dr. Danielle Santana-Coelho, Dr. Joaquin Lugo

The Observational Analysis of the Behavioral Differences Between Palaemonetes paludosus and Pomacea bridgesii
» Ms. Kirstey Ferguson, Dr. Laura Weiser Erlandson

Analysis and Validation of Quantitative Trait Locus Mapping of Locomotive Behaviors in Drosophila species
» Mr. Pedro Rodriguez Navarro, Yuan Yuan Kang

FISH DIVERSITY IN ROATÁN, HONDURAS
» Emily Boling, Morena Flores Mejia, Rebecca Musick, Lorelei Payne, Anne Mowry, Dr. Traesha Robertson, Dr. Jacqueline Dove, Dr. Stephanie Lockwood, Stephanie Randell

The Need to Feed: Investigating Feeding Practices for Zebra Mussels in Laboratory Research
» Amya McCarroll, Cadence Sen, Chase Herrington, Dr. Jason Locklin

Continued from **Friday, 28 February**

Discovering novel inhibitors for 6-phosphogluconate dehydrogenase in Plasmodium vivax
» Celeste Rodriguez, Ifeanyichukw Nwofor, Dr. Josh T. Beckham

Neuroplastic Changes in Opioid Tolerance: A Comparative Study of Oxycodone and Fentanyl
» Arjun Trehan, mariana dejeux, Sarah Jewanee, Blake Reeves, Dr. Benjamin Schwartz, Dr. Jacques Nguyen

Effect of abiotic stresses on cellular responses in Penium margaritaceum
» Kassandra Orellana, Dr. Kattia Palacio-Lopez

Quantification of individual flavonoids and methylxanthines in cacao nibs sourced from different origins
» Alex Dow, Samantha Hazen, Holly Lawson, Emily Niemeyer

Progenesis as an Explanation for the Similarity Between Adult Miniaturized Geckos and Juvenile Larger Geckos' Hands
» Mrs. Elyse Howerton, Dr. Juan D. Daza, Dr. Aaron Bauer

Arginine Kinase 1 is necessary for eye development in Drosophila melanogaster
» Amber Reynolds, Josceline Tenido, Kaycee Torres, Courtney Farrington, Mrs. Mardelle Atkins

An Affinity Analysis of Aliivibrio fischeri and Zooxanthellae
» Murphy Jacobie, Dr. Stacie Brown

Analysis of Microplastic Concentrations in Dried Algae Mats and Sediment Collected from Detention Basins in the Edwards Aquifer Recharge Zone.
» Paulina Quinonez, Mr. Andre Felton, Dr. Jeffrey Hutchinson

Threads of Change: Zooplankton community shifts in response to fiber disturbances
» Caitlyn Lankford, Heaven Thompson, Ashton Fisher, Addison Lehew, Mary Kay Johnston

Hemangiosarcoma in Canines: A Personal Case Study in Disease Progression and Therapy
» Mr. Yuto Goto

Microgravity Experiment for Lunar Dust (MELD): A platform to study lunar dust interactions with surfaces
» Samantha Daigle, Karissa Coker, Jeffry Kelber, Eduardo Bidot, Matthew Wittal, Richard Zhang, John Beatty

A Study of the Default Mode Network in Individuals with ADHD
» Mr. Yuto Goto

Rad7-Rad16 in global genome nucleotide excision repair in Saccharomyces cerevisiae
» Ms. Chathurika Hewa Bhashithage, Dr. Jung-Hyun Min

Plants Grown at Reduced Pressures for Extraterrestrial Environments
» Craig Bateman, John Beatty

Synthesis and characterization of copper (II) complexes with 1,10-phenanthroline-5,6-dione and derivative ligands: Potential applications in triple-negative breast cancer therapy
» Mr. Matthew Cartwright, Ms. Sofia Stanfield, Dr. Hadi Arman, Dr. Charles Fermaint, Dr. Rafael Adrian

Effect of rapamycin and minocycline on autistic-like behaviors in male C57BL/6J mice after early life seizure induction.
» Ms. Sydney Pell, Katherine Blandin, Ms. Taylor Bradish, Ms. Madison Wallis, Ms. Chloe Lau, Mr. Colton Kelley, Mr. Luke Hammett, Mr. Joshua Thayil, Ms. Ashley Smelley, Mr. Gautham Chelliah, Mr. David Narvaiz, Ms. Leighton Douglas, Ms. Linay Burge, Dr. Joaquin Lugo

Calcium analysis of eggshells
» Ms. Kathryn Clevenger, Dr. Alyx Frantzen

Continued from **Friday, 28 February**

Studies of the transition metal complex on Human Serum Albumin
» Ms. Tess Corbett, Ms. Nkeiruka Aziekwu, Ms. Perla Tovar, Bidisha Sengupta

The Effects of Vitamin D on Zebrafish in Varied pH Environments
» Ethan Cortez

Primer Design: Developing New Tools for DNA Sequence Investigation in the Plant Genus Mentzelia
» Ms. Kseniia Schneider, Ms. Amy Osborn, Joshua Brokaw

Novel palladium(II)-polyphenol complexes: Synthesis, characterization, and anticancer potential against triple-negative breast cancer cells
» Mr. Victor Torres, Ms. Sofia Stanfield, Dr. Hadi Arman, Dr. Charles Fermaint, Dr. Rafael Adrian

Geologic Salt Analysis
» Katelyn Jones, Dr. Alyx Frantzen, Dr. Julie Bloxson

Metabolic Fingerprinting of Creek Ecosystems: The Influence of Urban Stressors on Productivity and Respiration
» Ria Bhatia, Carol Tran, Isabella Serrao, Charles Yang, Joji Sherman, Irfan Eshan, Kandace Diaz, Dr. Mary Poteet

Generalized Happy Numbers
» Mr. Briley Elrod, Dr. Rachel Lynn

From Storm Drains to Streams: How Riparian and Upland Leaf Inputs Transform Urban Creek Ecosystems
» Ms. Zoe Herndon, Mireya Velazquez, Alyssa Steinhart, Celeste Rodriguez, David Rimada, Pablo Ramos, Nardos Shiferaw, Madison McGee, Dr. Mary Poteet

Exploring Thermal Variability in Urban Creeks: The Combined Influence of UHI and Hydrogeology
» Areli Velasquez, Alondra Trejo, Catherine Byelousova, Zachary Courreges, Kimberly Tran, Sommer Montes, Zenaida Rodriguez, Dr. Mary Poteet

The limitations of using intrapersonal isotopic variation within the use of commingled bones
» Ms. Tori Rowe, Ms. Stephanie Baker, Ms. Emma Giacomello

Proportion of Daily Community Respiration in Texas Farm Ponds for Which Plankton are Responsible
» Ms. Sarah Baggett

Mechanism of the Rad34-Rad23-Rad33 in RNA Polymerase I-associated transcription-coupled nucleotide excision repair of yeast
» Ms. Meenuka Dalpathadu, Ms. Linh Pham, Prof. Kenji Murakami, Dr. Jung-Hyun Min

Automating Flashcard Creation: A Python-Based Approach for Organic Chemistry Education
» Benjamin Rybak-Dow, Patrick Harlan, Connor Stear, Lance English

Development of a Protein Structure Driven CURE Module for Second-Semester Organic Chemistry
» Connor Stear, Cas Knox, Benjamin Rybak-Dow, Dr. Steven Whitten, Lance English

Establishment of fish tissue cultures to assess toxicity of copper
» Ms. Tadeen Feroz, Ms. Olivia Donnelly, Ms. Taryn Pledger, Ms. Kaci Monk, Ms. Tyler Shannon, Dr. Scott Dyer

Using Guided Antimicrobial Peptides to Target Oncomicrobe F. nucleatum and Prevent Colorectal Cancer Progression
» Ms. Allison Barton, Dr. Ankan Choudhury, Dr. Leigh Greathouse

Ecological conflicts inherent in the spread and management of a Texas invasive, Paulownia tomentosa
» Dr. Richard Patrock

Continued from **Friday, 28 February**

Assessment of Fish Tissue Cultures as Substitutes for Animal Tests
» Ms. Taryn Pledger, Ms. Tadeen Feroz, Ms. Olivia Donnelly, Ms. Kaci Monk, Ms. Tyler Shannon, Dr. Scott Dyer

Characterizing The Role of dennd5b in Zebrafish Through Microinjection During Early Embryonic Development
» Isabella Simon, Magdalen Marston, Ms. Alicia Mendoza, Dr. Sharmin Hasan

Identifying Novel Inhibitors of 3-oxoacyl-(acyl-carrier-protein) reductase in Plasmodium falciparum to combat malaria
» Haneef Ibrahim, Dr. Josh T. Beckham, Dr. Walt Fast

Role of fnbp1 during early development of vertebrate
» Mr. Ty Franklin, Dr. Sharmin Hasan

Making decisions: does mitochondrial metabolism influence retinogenesis?
» Yaqueline Gutierrez, Yessenia Beltran, Emilia Santamaria, Elda Rueda

Increasing ethanol concentrations in increments can detrimentally affect yeast cell viability: modeling alcohol toxicity in animal cells.
» Mr. Logan Olguin, Mr. Brennen Leidy

The small mammal fauna from Matjhabeng, a Pliocene fossil locality in the Free State of South Africa.
» Mr. Brennen Leidy

Explaining the relationship between elevation and gut-microbe diversity of Sceloporus Poinsettii (Crevice Spiny Lizard) between the Christmas and Davis mountains
» Thomas Levrie, Thornton Larson

7:45pm **Poster Session Adjourned**

Saturday, 1 March

7am **Past Presidents & Fellows Breakfast**
MAC 304 @ MCC

7:45am **(S1) Chemistry & Biochemistry C**
MAC 111 @ MCC
Chaired by: Darrell Fry and Bidisha Sengupta

7:45am **Impact of Soil Microalgae on Olivine Weathering**
» Ms. Layla Jackson, Ms. Lauren Bomer, Dr. Betsy Leverett, Dr. John Hooker, Dr. Alakananda Chaudhuri

8am **Redox Cooperativity Analysis with Computational Chemistry: Interplay Between Energy Matching and Geometric Arrangement in Redox Non-Innocent Systems**
» Hadley Watts, Dr. John Gary

8:15am **Role of the NAC Linker in Early Protein Sorting**
» Travis Bishop, Emir Maldosevic, Dr. Ahmad Jomaa

8:30am **Structural rearrangements in lanthanum glutarate bromotherephthalate, La□(Glut)□(TPBr)(H□O)□·4H□O, initiated by drying**
» Dr. Ralph Zehnder

8:45am **Structure and mechanisms of Nucleotide Excision Repair in yeast**
» Dr. Jung-Hyun Min

9am **Substances of Health Concern: Label Accuracy of Cannabidiol and Tetrahydrocannabinol in Commercial Tinctures from the United States**
» Mr. Zander Sullivan, Dr. Coady Lapierre, Dr. Laura Weiser Erlandson, Dr. Linh Pham

Continued from **Saturday, 1 March**

9:15am **Synergistic Effects of Watercress Extract with plant flavonoid Kaempferol against Oxidative Damage in Human Serum Albumin**
» Ms. Nkeiruka Aziekwu, Ms. Bidisha sengupta

7:45am **(S2) Mathematics & Computer Science**
MAC 206 @ MCC
Chaired by: Dipak Singh and John Garza

7:45am **A Multimodal Approach for Resource Allocation During Natural Disasters**
» Agafia Bowden, Dr. Dipak Singh

8am **Classifying Z-related sets of order 5**
» Nicholas Jones, Prof. William Erickson

8:15am **Dissipative quantum systems with non-local point interactions**
» Christoph Fischbacher, Chloe Povey-Rowe, Brady Zimmerman, Danie Paraiso

8:30am **Lies and Deceptions of the Traveling Salesman**
» Prof. Paul Feit

8:45am **Methods Connecting Differential Operators and Combinatorics *withdrawn***
» Mr. Jonathan Thomas, Prof. William Erickson

9am **Predicting chemical respiratory sensitizers with machine learning QSAR models**
» Kiera Griffin, Dr. James Liu, Ms. Taylor Jefferis, Dr. Joshua Peeples, Christie Sayes

9:15am **Towards a Universal Format for Exercise Construction**
» Prof. Paul Feit

7:45am **(S3) Plant Biology**
MAC 235 @ MCC
Chaired by: Kevin Eddy and Josh Brokaw

7:45am **"Exploring Native West Texas Plant Extracts for Anti-Hemolytic Properties: Potential Natural Remedies for Red Blood Cell Protection and Inflammation**
» Ms. Atlanta Williams, Ms. Sui Tial

8am **Gene flow among populations of the annual wildflower Mentzelia pectinata (Loasaceae).**
» Ms. Amy Osborn, Gisela Guerrero, Jessica Edo, Yourim Cho, Joshua Brokaw

8:15am **Life History Evolution in the Annual Mentzelias: Sections Bicuspidaria and Trachyphytum (Loasaceae)**
» Joshua Brokaw

7:45am **(S4) Physics & Engineering**
Lecture Hall @ MCC
Chaired by: Cody Crosby and Brian Flowers

7:45am **Adapting an Open-Source Syringe Extruder to Photocrosslink Soft Hydrogels**
» Joseph Dorsey, Amanda Mejia, Angel Rodriguez, Sabrina Woodward, Domenic Cordova, Cody Crosby

8am **Evaluating Deep Learning Models for Multiclass Classification of LIGO Gravitational Wave Glitches**
» Mr. Rudhresh Manoharan, Dr. Gerald Cleaver

8:15am **First Principle calculations of effective Hubbard Parameter**
» Mrs. Manjula Raman, Mr. Anjy-Joe Olatunbosun, Dr. Kenneth Park

8:30am **From Dust to Dawn: The Search for Young Stellar Objects**
» Peter Newcomer, Dr. Luisa Rebull, Dr. April Andreas, Kivan Andreas, Andres Mar, Mickayla Tosch, Mr. David Dahari, Gabriel Dahari, Sahar Sultani, Mr. Joseph Perry, Ricky Perry, Maddie Sullivan, Mr. Jeff Benter, Bo Zeleznik, Jackson Ritchie, Tanner Hurliman, Jack Benter

Continued from **Saturday, 1 March**

8:45am **Historic First Liquid Fueled Advanced Nuclear Reactor permitted by the NRC**
» Dr. Charles Ivey

9am **Optimizing biomass pyrolysis and syngas reformation: A study on microwave reactor variables and efficiency**
» Chase Rheinlander, Dr. Chao Dong

9:15am **Pioneering Climate Resilience through Innovating Property-Variable Materials for South Texas' Energy Transition**
» Jingbo Liu, Sajid Liu

7:45am (S5) Neuroscience

MAC 236 @ MCC
Chaired by: Seena Mathew and Dr. Danielle Grove

7:45am **Abdominal photobiomodulation (PBM) as a therapeutic intervention for autism spectrum disorder (ASD): Impacts on mitochondrial function and gut health**
» Dr. Gabriela Guimaraes, Sarah Diaz, Ms. Nicole Jackson, Mr. Nisarg Vshah, Dr. Douglas Barrett, Dr. Francisco Gonzalez-Lima

8am **Assessing Anxiety in a Zebrafish Nicotine Cessation Model**
» Britney Castillo, Dr. Ayman Hamouda, Dr. Brent Bill

8:15am **Augmenting Cognitive Behavioral Therapy for Major Depressive Disorder with Transcranial Infrared Laser Stimulation**
» Dr. Douglas Barrett, Dr. Christopher Beevers, Dr. Francisco Gonzalez-Lima

8:30am **Cognitive Improvement and Prefrontal Network Interactions in Individuals with Remitted Bipolar Disorder after Transcranial Infrared Laser Stimulation**
» Dr. Roger Davis, Dr. Douglas Barrett, Dr. Erin Logue, Dr. Andreana Haley, Ms. Amy Bichlmeier, Ms. Lucy Chibib, Dr. Jennifer Siegel-Ramsay, Mr. Farzad Salehpour, Laura Gamboa, Mr. Anagh Mirji, Mr. Kevin Thakkar, Dr. Gabriela Guimaraes, Sarah Diaz, Mr. Hunter Dutkiewicz, Isabelle Rose, Jana Jimenez, Mr. Jordan Schwartz, Dr. Jorge Almeida, Dr. Francisco Gonzalez-Lima

8:45am **Effects of Transcranial Infrared Laser Stimulation on Brain Rhythmic Electrical Activity and Cognitive Aging**
» Isabelle Rose, Dariella Fernandez, Laura Gamboa, Mr. Hunter Dutkiewicz, Sarah Diaz, Dr. Roger Davis, Dr. Gabriela Guimaraes, Dr. Douglas Barrett, Dr. Francisco Gonzalez-Lima

9am **Location-independent axon pathfinding in the hindbrain of larval zebrafish**
» Annika Tracy, Dr. Kimberly McArthur

9:15am **Mental-Mixtral: AI-powered multi-modal mood disorder detection**
» Ms. Nikila Swaminathan

9:30am **Python-Based Machine Learning For Three-Dimensional Human Brain Model Segmentation and Analysis**
» Ms. Morgan Smith, Dr. Elizabeth Ochoa, Dr. Kevin Bieniek

9:45am **Transcranial Infrared Laser Stimulation (TILS) Improves Impulse Control in Adults with Attention-Deficit/Hyperactivity Disorder (ADHD)**
» Mr. Farzad Salehpour, Dr. Douglas Barrett, Mr. Anagh Mirji, Ms. Ayla Farzamnia, Mr. Vikas Burugu, Dr. Francisco Gonzalez-Lima

8am Registration

Science Building Lobby @ MCC

8am Administration Office: Treasurer and Collegiate Academy Judges

MAC 108 @ MCC

Continued from **Saturday, 1 March**

8:30am **Plant Biology Section Meeting**
MAC 237 @ MCC

8:45am **(S3) Terrestrial Ecology & Management**
MAC 235 @ MCC
Chaired by: Richard Patrock

8:45am **Do Grasses of Central Texas Use Water Stored in Limestone?**
» Mr. Eli Hartung

9am **Structure and composition of forests in the Leon and Salado Creek Greenways**
» Ms. Natalie Martinez, Dr. Jeffrey Hutchinson

9:30am **Terrestrial Ecology & Management Section Meeting**
MAC 237 @ MCC

9:30am **Mathematics & Computer Science Section Meeting**
MAC 207 @ MCC

9:30am **Physics & Engineering Section Meeting**
MAC 200 @ MCC

9:30am **(S1) Coffee Break**
MAC 1st 2nd & 3rd floor lobbies

9:30am **(S2) Coffee Break**
MAC 1st 2nd & 3rd floor lobbies

9:30am **(S3) Coffee Break**
MAC 1st 2nd & 3rd floor lobbies

9:30am **(S4) Coffee Break**
MAC 1st 2nd & 3rd floor lobbies

9:45am **(S1) Chemistry & Biochemistry D**
MAC 111 @ MCC
Chaired by: Darrell Fry and Bidisha Sengupta

9:45am **Synergizing Biocompatible Nanoagents with AI for Revolutionary Forensic Fingerprint Analysis**
» Jingbo Liu, John-Ryan Lawrence, Zhaohui Wang, Sajid Liu

10am **Synthesis and Characterization of a Water-Soluble TAK-242 Prodrug**
» Jacquelin LaBerteaux, Prof. Bob Kane

10:15am **Synthesis of AER-270 prodrugs to inhibit Aquaporin-4 using controlled-release kinetics**
» Mr. Akhil Kumar Sarkar, Dr. Michael Nicosia, Dr. Anna Valujskikh, Prof. Bob Kane

10:30am **Synthesis of bis-diamine monomer to construct oligo-benzodiazaborole-based macrocycles.**
» Mrs. Sathsara Senarathne, Mr. Javier Hodges, Prof. Dustin Gross

10:45am **Synthetic Efforts Towards Novel Prodrugs of TAK-242 (Resatorvid) for Localized Immunosuppression**
» Rahul Gaykar, Prof. Bob Kane

Continued from **Saturday, 1 March**

11am **The growth and characterization of intermetallic compound Gd4Mn4Sn7**
» Teddy G. Spencer, Ms. Morgan E. Raines, Dr. Gregory T. McCandless, Dr. Julia Y. Chan

11:15am **The Silicon-Germanium Bond**
» Keith Pannell

9:45am **(S3) Conservation Ecology**
MAC 235 @ MCC
Chaired by: Wendi Wolfram

9:45am **Assessment of Bird Communities Using eBird Data in the Red River Basin Following a Significant Weather Event**
» Zoe R. Williams, Jessica L. Coleman, Matthew J. Greenwold

10am **Detecting Leptonycteris nivalis at Emory Cave using airborne eDNA**
» Ashley Loehn, Dr. Loren Ammerman

10:15am **Effects of Invasive Chinaberry Tree Fruits on Invasive Asian Clams in Texas**
» Amy Lowe, Marion Mundy, Dr. Chris Distel

10:30am **Effects of Stream Restoration on Caddisflies**
» Fernanda Gonzalez, Dr. Mark Gustafson

10:45am **Environmental DNA detection of the Endangered Rio Grande Silvery Minnow**
» Ms. Julianne Bullock, Dr. Matthew A. Barnes

11am **Spatio-temporal patterns of environmental DNA detectability for a cryptic species of greatest conservation need**
» Kyra S. Woytek, Dr. William I. Lutterschmidt, Dr. Christopher M. Schalk, Dr. Daniel Saenz

10am **Neuroscience Section Meeting**
MAC 201 @ MCC

10am **(S5) Coffee Break**
MAC 1st 2nd & 3rd floor lobbies

11:15am **Conservation Ecology Section Meeting**
MAC 237 @ MCC

11:30am **Chemistry & Biochemistry Section Meeting**
MAC 200 @ MCC

11:30am **Lunch Break**
LTC Cafeteria @ MCC

12pm **Section Chairs Post Meeting**
MAC 204 @ MCC

12:30pm **Meeting moves from MCC to BU**

1pm **Registration (BU)**
HURD @ BU

1pm **Graduate Student Competition**
HURD @ BU

1pm **Mechanisms of Toxicity and Metabolic Disruption by Bisphenol Analogs in Human Cell Models**
» Rafia Afroze Rifa, Dr. Ramon Lavado

1:15pm **Antimicrobial Applications of Probiotic Byproducts in Food Safety**
» Min Ji Jang, Dr. Md Ariful Haque, Dr. Hae Woong Park, Prof. Seockmo Ku

Continued from **Saturday, 1 March**

1:30pm **Effects of Transcranial Photobiomodulation on Symptoms of Autism Spectrum Disorder**
» Sarah Diaz, Dr. Gabriela Guimaraes, Ms. Nicole Jackson, Mr. Nisarg Vshah, Dr. Roger Davis, Dr. Douglas Barrett, Dr. Francisco Gonzalez-Lima

1:45pm **Comprehensive insights into mosquito species diversity and habitat-specific host selection patterns to enhanced surveillance of vector-borne pathogens in Cameron Park Zoo, Waco, Texas.**
» Ms. Dhivya Rajamanickam, Dr. Jason Pitts

2pm **Examining the rescuing effects of voluntary wheel running on depressive-like behaviors and neuroinflammation in a mouse model of hyperglycemia**
» Ms. Laura Kusumo, Grace Summers, Mr. Matthew Folh, Mr. Jonathan Duhon, Ms. Kaylea Gawf, Dr. Elisabeth Vichaya

2:15pm **Modelling patterns of reproductive occupancy to inform management of toads in a dynamic desert system**
» Sadie Roth, Dr. Matthew A. Barnes, Dr. Kerry Griffis-Kyle

1pm **Administration Office: Treasurer and Collegiate Academy Judges**
HURD @ BU

3pm **Graduate School Fair**
HURD @ BU

3pm **Mentoring & Networking Session**
HURD @ BU

3pm **Faculty Reception**
HURD @ BU

3pm **Graduate Student Panel**
HURD @ BU

4pm **OTE Keynote Talk: Mark Rogers, Austin Achieve, TX**
HURD @ BU

4:45pm **DTS Keynote Talk: Dr. Jingbo Louise Liu, Professor of Chemistry, Texas A&M University-Kingsville, TX**
HURD @ BU

5:30pm **Awards Banquet**
HURD @ BU

8:15pm **TAS Annual Meeting Adjourned**

Sunday – Explore on Your Own

Sunday, March 1

Mammoth National Monument in Waco, Texas

The official Texas Academy of Science Conference program concludes on Saturday evening. Attendees wishing to extend their stay, can individually explore the remarkable natural attractions that Waco has to offer. Please note that the following suggestion is provided purely for informational purposes, and any visits would be independent of the TAS conference.

Discover the Wonders of the Ice Age!

Explore the Waco Mammoth National Monument, a site renowned for its significant paleontological discoveries. This unique location is home to the only known nursery herd of Ice Age Columbian Mammoths in America. These majestic creatures, standing 14 feet tall and weighing up to 20,000 pounds, roamed this region thousands of years ago.

Highlights of the Visit:

- **Fossil Exploration: Witness the fossil specimens of Columbian Mammoths and learn about their history.**
- **Guided Tour: Enjoy an informative tour led by expert paleontologists.**
- **Biodiversity Walk: Explore the park's 108-acre area, home to a variety of species including roadrunners and raccoons.**

Why Attend?

- **Educational Experience: Gain insights into paleontology and the Ice Age.**
- **Connect with Nature: Experience the diverse ecosystem and rich biodiversity of the park.**
- **Fun for All Ages: Suitable for students, families, and science enthusiasts.**

For more information, visit:
Waco Mammoth National Monument (U.S. National Park Service) (nps.gov)

POSTER ABSTRACTS

(by poster number)

P18 - EARLY-LIFE MEDICATION EXPOSURE: UNRAVELING THE GUT MICROBIOME'S ROLE IN NEURODEVELOPMENTAL DISORDER RISK

AUTHORS: Riya Palanki (Meridian World School)

ABSTRACT

Mental health disorders affect 20% of U.S. adults and 1 in 6 youth annually (National Alliance on Mental Illness [NAMI], n.d.), underscoring the importance of understanding factors that influence early neurodevelopment. This study explores the impact of early-life medication exposure on the gut microbiome and its potential effects on neurodevelopment, with a particular focus on anxiety, ADHD, and depression. The hypothesis posits that exposure to medications during childhood can significantly alter the gut microbiome, disrupt the gut-brain axis, and increase the risk of neurodevelopmental disorders. A thorough review of Pubmed literature and clinical studies reveals that commonly prescribed medications, including antibiotics, antipsychotics, corticosteroids, and NSAIDs, significantly impact the gut microbiome. For instance, antibiotics, frequently administered in childhood, were found to reduce microbial diversity, increase gut permeability, and promote systemic inflammation. These changes negatively affect brain development by disrupting neurotransmitter production and the integrity of the blood-brain barrier (BBB), essential for healthy neurodevelopment.The study further emphasizes the gut microbiome's role in regulating the immune system and the hypothalamic-pituitary-adrenal (HPA)axis, which are crucial for neurodevelopment. Probiotic interventions, particularly those containing Bifidobacterium and Lactobacillus, have shown promise in restoring microbial balance, enhancing short-chain fatty acid production, improving gut barrier function, and reducing systemic inflammation. This research advocates for the judicious use of early-life medications and explores the therapeutic potential of probiotics in supporting neurodevelopment. It highlights the critical role of gut microbiome and calls for further longitudinal studies to examine the long-term effects of early-life medication exposure and microbiome disruptions on neurodevelopment.

P19 – PULMONARY ENDOTHELIAL CELL PROLIFERATION IN RESPONSE TO HIV NEF SEQUENCE VARIANTS

AUTHORS: Eli Heath[1], Minh Nguyen[1], Mario Rodriguez[1], Amanda Garcia[1], Javaria Baig[1], Sharilyn Almodovar[1] (1. Texas Tech University)

ABSTRACT

People living with human immunodeficiency virus (HIV) are significantly more likely to develop pulmonary arterial hypertension (PH), a severe cardiovascular complication with poor prognosis. Here, we explored a potential mechanism of HIV-induced PH (HIV-PH) by examining the effects of HIV Nef on human pulmonary endothelial cell proliferation in vitro. This project investigated the effects of HIV Nef on pulmonary endothelial cell proliferation to determine its potential role in causing pulmonary hypertension. Here, we utilized banked Nef molecular constructs previously extracted from patients with known cases of HIV-PH. Briefly, the plasmid DNA encoding these Nefs were expanded using Top10 competent cells spread on agar plates treated with ampicillin, kanamycin, and G418. Colonies were picked, inoculated in Luria-Bertani broth, and pelleted. Plasmids were purified using QIAprep Miniprep Kit (Qiagen), and plasmid DNA was confirmed on previously sequenced plasmids with restriction endonucleases and gel electrophoresis. The unique Nef sequence variants were then purified as endotoxin-free plasmids using the Endofree Prep Maxi Kit (Qiagen) and transfected into human pulmonary arterial endothelial cell (HPAEC) cultures. Transfected cultures were incubated at 37ºC, 5% CO2 overnight, and work is in progress to measure cell proliferation. KI67 and PCNA, two cellular markers for proliferation, will be quantified by quantitative PCR and confirmed by live cell imaging of vascular co-cultures stained with nuclear dye Hoechst. We expect to identify the mutational profiles of HIV Nef that contributes to PH in our in vitro models.

P25 – MEMRISTORS: THE ELUSIVE CIRCUIT COMPONENT

AUTHORS: Vance Vyoral [1], Derek Johnston[1] (1. Texas Tech University)

ABSTRACT

The memristor is a quasi-theoretical circuit component which relates the electromagnetic elements of charge and flux, a concept originally introduced by Leon Chua. It has a varying resistance which is modulated by application of current and is maintained after the current is no longer being applied. This property of memristors has applications to a wide range of fields including machine learning and neuromorphic computing. The memristor has been built before but it came with a large production cost, such as the titanium dioxide design made by R. Stanley Williams. These factors present a need for a memristor that does not have that high cost by using different material. The purpose of this research was to develop a memristor that had similar properties

for a lower production cost. Nyle Steiner developed a low cost memristor composed of a copper sulfide and aluminum interface has been developed. This design decreases the overall cost for a memristor due to the overall cost of sulfur and copper being lower than the material cost of Williams design. To determine that the experiment produces a memristor, it should show the characteristic "bowtie" curve when subjected to a voltage sweep of -10V to 10V. Additionally, observations have been made of a conditioning effect in which noise in the memristive effect is decreased over subsequent voltage sweeps.

P26 – IDENTIFICATION OF NOVEL TRANSCRIPTS OF THE OBESITY RELATED, NEPL15 GENE FOUND IN DROSOPHILA MELANOGASTER

AUTHORS: Chase Drucker[1], Surya Banerjee[1] (1. Texas Tech University)

ABSTRACT

The Drosophila (fruit fly) Neprilysin-like 15 (Nepl15) gene encodes a protein that is predicted to be a secreted and catalytically inactive protein involved in the control of nutrient storage. Previous work with Nepl15 (knock-out) flies elicits that it plays a major role in storing glycogen and lipids in a sex-specific manner in adult fruit flies. Interestingly, the Nepl15 transcript is differentially expressed in larval organs and in male and female adult flies. The Nepl15 gene has only one known transcript and protein isoform in the fly database (flybase.org). Given that the Nepl15 gene is differentially expressed in a tissue-specific and sex-specific manner, our goal is to identify if there are different Nepl15 protein isoforms, and later identify the abundance of these different isoforms in different fly tissues and sexes. Thus, we propose RT-PCR, PCR, and sequencing-based approaches to identify whether multiple transcripts, and therefore, separate protein isoforms are made from the Nepl15 gene in wild-type adult male and female flies. During the project, we isolated total RNA from the wild-type male and female flies and convert them into cDNA by reverse transcription, followed by amplifying the cDNA copies by PCR using primers complementary to the transcript's 5' and 3' untranslated regions. Next, we gel purified the PCR products for sequencing to identify any variations in their nucleotide sequences. Thus, this project can elucidate the mechanism of Nepl15 role in regulating obesity and related metabolic disorders. Our research outcome could identify new therapeutics for treating these metabolic disorders.

P27 – EVALUATING THE ADIPOGENIC EFFECTS OF BISPHENOL S ON OP9 MOUSE CELLS

AUTHORS: Hailee McCulloch[1], Lizbeth Campos[1], Stephanie Perez[1], Danielle Grove[1] (1. Texas Lutheran University)

ABSTRACT

We encounter plastic products daily. Common plasticizers, including bisphenols, are added during the production of plastic products to alter the characteristics of plastics. Bisphenols have been associated with many health conditions. Restrictions and regulations have been placed on many plasticizers, and analogs of bisphenols have been used as replacements without much testing or evaluation. Bisphenol S (BPS), a common analog of bisphenol A (BPA), has been used to produce many products. BPS has been shown to negatively affect cell lines, inducing adipogenesis specifically. The purpose of the current experiment is to evaluate the effects of BPS on OP9 cells and examine if BPS causes adipogenesis in this cell line. The cells were dosed with BPS, ranging from 0.00001 – 10 µM. Two trials of the experiments were conducted, with the number of days for treatment and maintenance varying. At the end of the period, the cells were stained with Oil Red O, and ultraviolet-visible spectroscopy was used to quantify the lipid concentrations for duplicate wells. Variations were observed across the results for both trials, but trends were also observed. One conclusion could be that BPS did cause differentiation, leading to adipogenesis. However, differentiation might have happened too quickly due to the tendency of OP9 cells to become adipocytes. This observation could have led to the variability. The results were deemed inconclusive. Future work is required to determine the exact effects of BPS. Future work would include performing a cell viability assay and changing the timing of exposure in the protocol.

P28 – THE EFFECTS OF DIMETHYL TEREPHTHALATE ON ADIPOGENESIS IN AN OP9 MOUSE CELL MODEL

AUTHORS: Sophie Salgado[1], Eric Moninger[1], Stephanie Perez[1], Danielle Grove[1] (1. Texas Lutheran University)

ABSTRACT

The omnipresence of plastic products has recently become a major health concern due to an emerging association between plasticizer chemicals and several metabolic disorders. Some plasticizers are considered endocrine disrupting chemicals (EDCs) and can leach from these products into the environment leading to human exposure. Scientific evidence has found that EDCs disrupt

adipocyte function causing features of conditions like obesity. In this study, the effects of the para-phthalate dimethyl terephthalate (DMT) on adipocyte differentiation were investigated in an OP9 mouse cell model. While many phthalate chemicals have exhibited adipogenic effects, DMT, a chemical used in polyethylene terephthalate (PET) plastic products, requires further investigation. Cells were treated with varying doses of DMT (0.1 nM, 1 nM, 10 nM, 0.1 µM, 1 µM, 10 µM, 100 µM) and differentiated during two cellular assays. Increased lipid accumulation compared to the control was seen at all concentrations, excluding the 100 µM concentration, and confirmed by ultraviolet-visible spectroscopy of Oil Red O staining. The decrease observed in the 100 µM concentration may indicate a cytotoxic effect induced by DMT. Due to time constraints, a cell viability assay and third differentiation assay were not completed. Future continuation of this research will evaluate the cytotoxicity of DMT toward OP9 cells and include additional differentiation assays. However, this study suggests that DMT displays obesogenic activity as seen in previous literature, thus adding to health concerns associated with the chemical. The use of DMT in PET plastic should be further evaluated for its safety.

P29 – SCREENING TZ62, TZ70, AND TZ71 FOR INHIBITION OF METASTASIS

AUTHORS: Maximiliano Perez[1], Rachna Sadana[1], Vaishali Chaubal[1] (1. University of Houston-Downtown)

ABSTRACT

Cancer cells have a distinct trait known as metastasis, which is an intricate process in which cells from a primary tumor site can detach, enter the bloodstream, infiltrate other organs, and proliferate, thereby spreading cancer. Previous results within our lab established 3 promising compounds, TZ62, TZ70, and TZ71, from a set of 17 compounds (coded as TZ) that induced apoptosis in A549 and Molt-4 cancer cells when tested using Caspase 3/7 Activation assay and Mitochondrial Membrane Potential assay. To establish the effectiveness of the compounds in reducing metastasis, our lab utilized a Wound Healing Assay on the A549 cell line, an adherent lung cancer cell line, to see if compounds that inhibit cell survival can also inhibit metastasis. A549 cells were incubated in a 12-well plate for 24 hours. A streak was made within each well and cells were treated with 20uM of final concentration with the respective compound. PBS and Doxorubicin were used as the negative and positive controls respectively. Images were taken over a period of 72 hours, and the change in area was measured. Our preliminary results indicate that effective Tz70 has the potential to inhibit metastasis.

P34 – AN EXPERIMENTAL ALGORITHM ANALYSIS FOR DIE CONFIGURATIONS

AUTHORS: Mary Heeren[1], Jeremy Becnel[1] (1. Stephen F. Austin State University)

ABSTRACT

In this project, we explore algorithms for generating die configurations. Three distinct algorithms are developed that accept as input the number of sides for a die and the total number of pips across all sides of the die. From this input, the algorithms generate all possible die configurations. The efficiency of the algorithms is compared.

P36 – THE EFFECTS OF DRIVING UNDER THE INFLUENCE OF CANNABIS, A META-ANALYSIS.

AUTHORS: Om Tannu[1] (1. Jordan High School

ABSTRACT

Background: With the growing trend of recreational and medicinal cannabis use, concerns about its impact on driving have increased in recent years. Tetrahydrocannabinol (THC), the main psychoactive compound in cannabis, impairs cognitive functions, problem-solving, and motor skills. These impairments can contribute to potential driving hazards. The on-the-road driving test is a Gold Standard for validating any substance's safety while driving. The primary parameter for the on-the-road driving test is the standard deviation of lateral position (SDLP), which measures lane weaving and over-correcting. Hence, I evaluated the effects of cannabis use on SDLP by doing a meta-analysis. This analysis was done using data from studies involving on-the-road driving tests. Methods: Following PRISMA guidelines, a literature search across the MEDLINE, APA PsycINFO, Web of Science, and Ovid Embase was conducted up to February 2024. Only placebo-controlled double-blind studies with healthy volunteers were used for this study. Out of 20 studies reviewed, 9 met the inclusion criteria, encompassing 127 participants with an average age of 28.9 years. Data analysis used a continuous random effect model. Results: The meta-analysis demonstrated a significant increase in SDLP among the cannabis users compared to placebo (mean difference 2.711cm, 95% confidence interval: 1.683-3.738, P<0.001)

indicating increased lane deviation. Conclusion: This is the first meta-analysis to demonstrate a significant relationship between cannabis use and increased SDLP, a key marker of driving impairment. The findings highlight the need for caution regarding cannabis use when driving, with young adults, as it impairs critical functions needed for safe driving.

P37 – INFECTION SITES DO NOT AFFECT VIRULENCE FACTORS OR BIOFILM FORMATION BY PSEUDOMONAS AERUGINOSA

AUTHORS: Eltayeb Diab[1] (1. Texas Tech University)

ABSTRACT

Pseudomonas aeruginosa (PA) is an opportunistic pathogen responsible for a wide range of infections. PA is the principal pathogen associated with chronic pulmonary infection in patients with cystic fibrosis (CF). In addition, PA infections are prevalent among patients with burn wounds, acute leukemia, and organ transplants, and among intravenous drug users. A major part of the PA virulence is attributed to its ability to produce several extracellular virulence factors including elastase (LasB) and pyoverdine. LasB is a metalloprotease which degrades elastin and collagen and inactivates human immunoglobulin G. Pyoverdine, which is essential for PA growth, within the host, binds iron with high affinity and sequesters it from the host binding proteins such as transferrin, serum alpha-1 proteinase inhibitor, and several complement components. In addition, at different infection sites, P. aeruginosa exists within biofilms which protect them from antibiotics and host response mechanisms. We hypothesized that the environment at the infection site influences biofilm formation and virulence factor production by PA. We examined this hypothesis by analyzing elastase and pyoverdine production by PA isolates obtained from either CF patients with chronic lung infections or severely burned patients with wound infections using Elastin Congo Red and pyoverdine assays, respectively. We also analyzed biofilm formation using the microtiter plate assay. Regardless of the infection site and except for two, all tested isolates produced comparable levels of LasB and pyoverdine. In addition, all isolates formed mature well-developed biofilms. These results suggest that LasB, pyoverdine, and biofilm formation are essential attributes for PA virulence.

P40 – SYNTHESIS OF SUBSTITUTED INDOLES AND IMIDAZOPYRIDINES THROUGH N-ALKYNYL IMIDAZOLES

AUTHORS: Gabriel Martinez[1], Mohanna Muppidi[2], Sean Kerwin[2] (1. Texas Lutheran University, 2. Texas State University)

ABSTRACT

The synthesis of substituted indoles and imidazopyridines through N-alkynyl imidazoles has not been documented. The starting reagents of N-alkynyl imidazoles are not readily available for a reasonable price. This means that synthesizing them is the best option. Finding new ways to synthesize possible new cores of drugs will help lead to discoveries in the future. Refining the techniques and conditions to obtain a high yield will help ease future researchers' use of these as the starting materials for more complex synthesis.

P43 – A MORPHOLOGICAL ANALYSIS OF THE DOPAMINERGIC PATHWAY IN THE BRAIN OF A MALE-PREGNANT PIPEFISH

AUTHORS: Madeleine Thomas[1], Sunny Scobell[1] (1. Southwestern University)

ABSTRACT

The family Syngnathidae (seahorses, pipefish & sea dragons) are the only group of vertebrates exhibiting male pregnancy. Males fertilize eggs from females and incubate them in a specialized ventral brood pouch. In most vertebrates, reproduction and pregnancy are regulated by the hypothalamic-pituitary-gonad (HPG) axis via the ultimate release of sex steroids that alter reproductive function. In syngnathids, an additional axis should be considered: the hypothalamic-pituitary-pouch (HPP) axis. To investigate the HPP-axis and hormonal regulation of male pregnancy, key neuroendocrine regulators of pituitary hormones should be considered. However, syngnathid neuroanatomy remains largely unexplored. Our neuroanatomical studies of the Northern pipefish, Syngnathus fuscus, revealed tyrosine hydroxylase (TH - an enzyme in the dopaminergic pathway) reactivity in the brain and pituitary. These dopaminergic neurons were prevalent in the hypothalamus and projections were observed in the pars intermedia and proximal pars distalis of the pituitary. In other fish, dopamine is a potent inhibitor of prolactin and GnRH1, two hormones that are likely involved in the regulation of male pregnancy. However, little is known regarding the functions of the

dopaminergic system in syngnathids. Our goal is to create an atlas of dopaminergic neurons and projections in the brain and pituitary of the Northern pipefish and the closely-related Gulf pipefish, S. scovelli. This work represents the start of a body of work that will elucidate the role of dopamine during the reproductive cycle in male syngnathid pregnancy.

P44 – THE IMPACT OF OBESITY ON FEMORAL CORTICAL BONE SIZE AND SHAPE

AUTHORS: Alanna Melchor[1], ChristiAna Dunham[1], Deborah Cunningham[1], Daniel Wescott[1] (1. Texas State University)

ABSTRACT

Previous research has demonstrated increased cortical bone structural properties in the femur associated with obesity. Here, we explore this further by examining cortical bone at subtrochanteric (20%) and midshaft (50%) on left femora from obese individuals in the Texas State Donated Skeletal Collection (TXSTDSC), including some with very obese Body Mass Index (BMI) scores (>40). We describe the cortical bone properties of these individuals (n=32) by investigating second moments of area around the major (Imax) and minor axes (Imin), polar second moment of area (J), and shape of cortical bone. Results show a significant increase in J and Imax at both subtrochanteric and midshaft in the very obese compared to high and moderate BMI individuals. Imin only shows a significant trend at midshaft. Variation in the cross-sectional properties also increase with increasing BMI. These results demonstrate that burden of obesity is reflected in the cross-sectional properties of the femur, especially in very obese individuals. Further research will explore the impact of obesity on a larger sample, including extremely obese individuals, and incorporate information regarding bone porosity to examine the effects of reduce mobility in the extremely obese.

P46 – A CRITICAL ANALYSIS OF THE BENT-HIP/BENT-KNEE LOCOMOTOR HYPOTHESIS FOR AUSTRALOPITHECUS AFARENSIS

AUTHORS: Jayci Bonnette[1], Adam Sylvester[2], Deborah Cunningham[1] (1. Texas State University, 2. Johns Hopkins School of Medicine)

ABSTRACT

The remarkable completeness of the Australopithecus afarensis specimen AL 288-1, otherwise known as “Lucy,” has allowed for extensive study of the locomotive repertoire utilized by the species. While it is generally accepted that Lucy walked bipedally, Stern and Susman (1983) argued that it was with a bent-hip/bent-knee gait rather than with a fully extended lower limb that we see in modern humans. Stern and Susman’s locomotor hypothesis was critically analyzed by configuring a modern reconstruction of their Figure 6, which depicts a superior view of the left os coxae articulated with the sacrum. Using Avizo, surface scans of first-generation casts of Lucy’s left os coxae and sacrum were aligned behind an image of Figure 6 with a translucent background. From this, three models were created and analyzed. Results indicate that it is anatomically impossible for Lucy’s bones to articulate as is depicted in Stern and Susman’s Figure 6. No support for the bent-hip/bent-knee hypothesis of hominin locomotion is found.

P47 – IVERMECTIN INDUCES APOPTOSIS ON HEC-1A ENDOMETRIAL CARCINOMA CELLS

AUTHORS: Jaitlynn Sherman[1], Matthew Dyson[1] (1. Wayland Baptist University)

ABSTRACT

Gynecological diseases and cancers affecting female health are significantly influenced by steroid hormones, which play a key role in conditions like endometriosis, uterine fibroids, and various cancers (breast, ovary, uterus, and cervix). This study focuses on comparing the effects of ivermectin on human endometrial carcinoma (HEC-1A) and breast cancer (MCF-7) cells to evaluate its impact on cell proliferation. Ivermectin, along with controls Staurosporine, cisplatin, and doxorubicin, was administered. Cellular responses were measured using the ApoTox-Glo assay, assessing apoptosis, cytotoxicity, and viability. The results showed that ivermectin slowed cell proliferation by inducing apoptosis, with consistent findings across experiments. However, cell morphology changes and crystallization suggested further analysis is needed. Future research will introduce estradiol (E2) to mimic hormonal conditions in women and explore the potential interactions between ivermectin, estrogen, and cancerous cell growth. This research may offer insights into ivermectin's therapeutic potential in treating female reproductive cancers and diseases.

P49 – VERTEBRAL CANAL CONSTRICTION: EXPLORING THE LINK BETWEEN VERTEBRAL NEURAL CANAL SIZE AND EARLY MORTALITY

AUTHORS: Kelsey Fox[1], Michelle Hamilton[1] (1. Texas State University)

ABSTRACT

Identifying skeletal markers of non-specific stress ranging from nutritional, socio-cultural, and physiological (known as embodiment) enables bioarcheologists to understand significant life events in past populations. Previous research has shown that vertebral neural canal (VNC) sizes may serve as indicators of non-specific stress. Dimensions of the anterior-posterior lumbar vertebrae complete growth during childhood (3-5 years) while transverse dimensions complete growth around (15-17 years). Previous research notes stunting in VNC dimensions, its relationship to younger ages at death in a bioarcheological skeletal sample, and its relationship to low socio-economic status (SES). This study explores whether a similar relationship exists in a forensic skeletal collection regarding selective mortality, SES, and VNC dimensions. Eighty-two adults, excluding those who reported lower back pain, from the Texas State Donated Skeletal Collection were assessed in the study (39 females and 43 males). The types of data collected include transverse and anteroposterior diameters of the lumbar vertebrae, age at death, stature, SES, and sex. The null hypothesis is that there is no relationship between selective mortality and lumbar VNC dimensions. A multiple factor analysis was performed on qualitative and quantitative variables followed by a cluster analysis. VNC shape did not relate to selective mortality for this sample, however, specific VNC dimensions were significantly associated with certain phases of SES (adult vs. childhood) that echo VNC growth trajectories. Further analysis is needed to determine VNC's relationship to SES. Applying bioarcheological approaches to contemporary skeletal collections will help determine the biological impact of SES in historic and contemporary populations.

P51 – ENHANCING BELONGING FOR UNDERREPRESENTED STUDENTS THROUGH STUDENT-DESIGNED LEARNING FIELD EXPERIENCES

AUTHORS: Brian Shmaefsky[1] (1. Lone Star College)

ABSTRACT

This study explores the effectiveness of teaching the scientific method related to field studies through student-driven observational studies of local wildlife behavior in an introductory environmental science course for college freshmen. By integrating place-based instruction with core field science principles, students gained hands-on experience in hypothesis formation, data collection, and analysis, while also developing a deeper connection to their local ecosystem. The project focuses on observing squirrel behaviors such as feeding, movement, and social interactions in nearby natural areas. Through structured assignments and guided inquiry provided by Squirrel Net, students learned to apply their understanding of scientific investigation.

P55 – A MITOCHONDRIAL BASED INTERVENTION FOR MILD COGNITIVE IMPAIRMENT (MCI) USING PHOTOBIOMODULATION, METHYLENE BLUE, AND MEDIUM CHAIN TRIGLYCERIDES

AUTHORS: Hunter Dutkiewicz[1], Jordan Schwartz[1], Francisco Gonzalez-Lima[1], Douglas Barrett[1], Gabriela Guimaraes[1], Isabelle Rose[1] (1. University of Texas at Austin)

ABSTRACT

Mild Cognitive Impairment (MCI) is an early indicator of Alzheimer's Disease (AD) and dementia, a preclinical AD stage with cognitive decline. Photobiomodulation (PBM), low-dose methylene blue (MB), and medium-chain triglyceride (MCT) supplements have shown improvements in cognition, possibly serving as a mitochondrial-targeted intervention for MCI. We aim to improve cognitive function by improving mitochondrial function and decreasing oxidative stress. This approach may improve neuronal metabolic function, thereby improving neurophysiology and cognitive abilities. Participants aged 65+ with MCI will be randomized into treatment or sham placebo groups. Initial assessments include vitals, cognitive testing, and functional near-infrared spectroscopy (fNIRS) recording during cognitive tasks to track cerebral hemodynamics. Afterward, they receive either transcranial PBM or a sham condition, followed by a second fNIRS recording. Over 60 days, participants will use an at-home PBM device daily

and take MB and MCT supplements, logging their activity and meeting weekly with researchers. After 60 days, participants will return for follow-up assessments, a debrief, and compensation. We have shown a dampened cerebral hemodynamic response from a single PBM session in older adults as compared to younger adults. However, we expect daily PBM to yield a higher response. Previous studies have shown cognitive improvements with PBM and MB, and we anticipate similar results in this study's treatment group. This study explores a mitochondrial-focused intervention for MCI, with promising support for PBM, MB, and MCT in reducing cognitive decline, potentially providing a preventive approach for AD and dementia.

P58 – EVALUATION OF MICROPLASTIC UPTAKE BY ASIAN CLAMS IN ISOLATED POOLS WITHIN AN EPHEMERAL STREAM IN CENTRAL TEXAS

AUTHORS: Ananya Seth[1], Jeffrey Hutchinson[1] (1. The University of Texas at San Antonio)

ABSTRACT

Asian clams (Corbicula fluminea) have been demonstrated to serve as effective bioindicators for microplastic contamination in marine and coastal ecosystems. This study provides a preliminary analysis of microplastic uptake by Asian clams in isolated pools within an ephemeral streams, focusing on their potential as a bioindicator of microplastics concentration within Leon Creek in San Antonio, Texas. Asian clams (n = 30) in March-April, 2025 will be collected from isolated pools to quantify and characterize the microplastic polymers ingested by Asian clams. Clams will be processed using an established protocol involving digestion with H2O2 to dissolved organic matter, purification via emersion within salinity gradients of NaCl, and extraction via vacuum separation. Key study objectives include assessing the concentration and types of microplastic polymers and their relative abundance in the clam tissues. Evaluating Asian clams ability to uptake microplastics can signal microplastic pollution in aquatic environments. This study aims to contribute valuable data on pollution trends in isolated pools within ephemeral streams and offer insights if the Asian clam may be a bioindicator species that could aid in long-term environmental monitoring.

P59 – LASER SYNTHESIS OF MIXED METAL SPINEL MATERIALS FOR THE OXIDATION REDUCTION REACTION

AUTHORS: Mal Millholland[1], Andres Garza[2], Makena Burns[1], Ben Martin[1] (1. Texas State University, 2. Southwestern University)

ABSTRACT

Laser treatment may be a cost-effective and environmentally-friendly method of enhancing catalysts for the oxygen evolution reaction (OER), which is typically the kinetically limiting step in water splitting for energy storage. Due to the rapid heating and cooling rates within a tiny area by laser treatment, it should be possible to generate a catalytically active material with mixed metal sites, a high number of defects, and a high surface area. Here, we target spinel phases that include Fe, Ni, and Co for the oxygen evolution reaction. Samples were prepared by spin coating mixtures of metal nitrates onto Ti discs. After drying, the samples were exposed to a 1064 nm pulsed laser to crystallize and activate the material. Laser heating conditions were controlled by adjusting the translation speed, pulse frequency, laser power, and focal distance. Products were characterized using scanning electron microscopy, X-ray diffraction, cyclic voltammetry, and chronopotentiometry. By adjusting synthesis conditions, we were able to produce catalysts with Tafel slopes less than 50 mV/dec and overpotentials less than 420 mV at 10 mA/cm>2>. We anticipate that this may be further improved by optimizing the composition and heating conditions.

P64 – MODELING THE OPTIMAL GROWTH OF GRAVITROPIC RESPONDENT SOLANUM PIMPINELLIFOLIUM ROOT SYSTEMS

AUTHORS: Aaron Garza[1], Arjun Chandrasekhar[1] (1. Southwestern University)

ABSTRACT

The root architecture of a wild tomato plant can be thought of as a biological network, where the main root is connected to various lateral roots. The structure of this network is constrained by two main factors, the cumulative distance of all the root lengths added up, which can be thought of as the total amount of root needed to create the structure (wiring cost), and the distances between the base of the main root and the lateral roots, which influences resource transport time (conduction delay). The goal is to minimize each constraint, however they inherently compete with one another. This means that optimizing one will result in poorer performance of the other. By utilizing the idea of Pareto optimality, we aim to create an algorithm that takes into account the effects of gravity in order to compute the Pareto front that will simultaneously optimize wiring cost and conduction delay.

P65 – COMPARATIVE MITOGENOME ANALYSIS OF PROCAMBARUS CRAYFISH SPECIES.

AUTHORS: Matthew Blow[1], Matthew J. Greenwold[1] (1. University of Texas at Tyler)

ABSTRACT

Several species of Texas crayfish in the Procambarus genus are listed as species of greatest conservation need (SGCN) by the Texas Parks and Wildlife Department (TPWD). However, little is known of their genome content and genetic relationship. Additionally, a search of the National Center for Biotechnology Information (NCBI) database, found only five full mitogenomes of Procambarus species (P. acutus, P. alleni, P. clarkii, P. fallax, and P. dupratzi).) To our knowledge, a comparative analysis of these mitogenomes has not been performed. This study focuses on two SGCN species, P. nigrocinctus and P. nechesase and two congeners (P. acutus, P. kenslyi) in addition to the five species on NCBI. Here, we sequenced and assembled four Procambarus mitogenomes from individuals captured in the Neches River basin (P. nigrocinctus, P. nechesase, P. acutus, P. kenslyi). These newly assembled mitogenomes vary in length from 15,433 to 16,669 nucleotides, have 17 to 19 tRNAs, and thirteen protein coding genes. We will present on the phylogenetic relationship among these nine Procambarus species and the outgroup species Faxonius (Orconectes) luteus including the evolutionary distance (dN-dS) for all thirteen protein coding genes. These data will help inform on SGCN crayfish in Texas, provide crucial data for the development of genetic conservation assays such as environmental DNA assays, and provide data for a state genetic database for crayfish.

P67 – DETERMINING INTRA-GENOMIC VARIATION OF CLADOSPORIUM VELOX: CONSIDERATIONS FOR AEROBIOLOGY FUNGAL METAGENOMICS

AUTHORS: Elise Berryhill[1], Josh McLoud[1] (1. LeTourneau University)

ABSTRACT

Cladosporium, the dominant airborne fungi in aerobiological investigations, may cause hay fever and asthma in sensitized individuals. This environmental allergen's intra-genomic variation in the barcoding region is an enigma, >750 species of this genera exist. This study identified the intra-genomic variation within the combined ITS 1 & 2 of Cladosporium velox; a deep sequencing approach followed by bioinformatic analysis with BBTools and MAFFT were implemented. Common methods for fungal community analysis implement an Illumina paired-end read sequencing where Qiime 2 is used to identify and quantify each community member by classifying multiple haplotypes into an operational taxonomic unit (OTU); the OTU is used to identify a species with a DNA homology of 97%. Yet, this 97% threshold is based on a bacterial model and intra-genomic variation for Cladosporium is not known. Here we show that C. velox possess a range of novel OTUs and when aligned with BLAST some align to species outside of the Cladosporium. We found that half OTUs at 93% were not the top alignments in BLAST, which was unexpected. The range of novel OTUs were reduced from 22,145 (100% identity) to 22 (93%). The 22 OTUs of the 93% threshold were aligned in BLAST; 1 was Epicoccum, 11 were Cladosporium, 4 were Cryptococcus, and 6 were artifacts. Results suggests that more isolates need to be sequenced to determine other airborne fungal intra-genomic variation, to support or refute our current definition of an OTU for fungi.

P68 – FACILITATING ARCHAEOLOGICAL RESEARCH THROUGH THE VETERANS CURATION PROGRAM

AUTHORS: Alanna Melchor[1], James Moore[1], Darrell Anderson[1] (1. Texas State University)

ABSTRACT

The U.S. Army Corps of Engineers (USACE) has conducted many significant archaeological investigations in Texas associated with erosion and flood control, military construction, and authorization of work and structures. Archaeological collections, resulting from survey and testing projects necessitated by the construction of Texas's reservoirs and water control systems, contain evidence of architecture, foodway activities, environment, and migration. Many of these collections are currently being processed by the Veterans Curation Program (VCP) at Texas State University's Center for Archaeological Studies. The VCP employs U.S. military veterans and was created as a career bridge from military service to the civilian workforce, while simultaneously working to rehabilitate the at-risk archaeological collections under the stewardship of USACE. The veterans at the VCP are currently working to process, catalog, and digitize the Joe Pool Lake (1979-1985) collection for future researchers to access. The archaeological sites investigated for this project provide meaningful insight into how culture, technology, and the natural environment changed over time. This poster will highlight the VCP's mission, discuss collections-based research, and provide information on the research value of the Joe Pool Lake collection by highlighting materials from the Penn Farmstead which saw intensive investigation due to the diversity and integrity of its extant structures.

P72 – DIET OF THE GREAT HORNED OWL (BUBO VIRGINIANUS) IN A CHICAGO SUBURB

AUTHORS: Timothy Campbell[1], Jasmine Zhai[1], Ashley Lanzarotti[1], Alexander Delgado[1], Samuel Gutherz[1] (1. Midwestern University, IL)

ABSTRACT

Great Horned Owls (Bubo virginianus - GHO) are large avian predators with a widespread distribution throughout the Americas and are found in all counties in Illinois. These owls are opportunistic generalists with one of the most diverse dietary niches of North American owls, although their diets generally consist of ~90% mammals and ~10% birds by biomass. Here we present results from an ongoing study of the vertebrate prey taken by GHO in the southwestern Chicago suburb of Downers Grove, DuPage County, IL. To date 458 pellets, partial pellets, and bone detritus assemblages have been recovered from Lyman Woods Preserve, Downers Grove Park District, with 271 having been analyzed. Mammalian craniodental and avifaunal humeri were utilized for identification to the lowest possible taxonomic level using published keys, dental formulas, and museum specimen images. Minimum number of individuals (MNI) were calculated using the most abundant sided element per pellet or assemblage. In total, 583 specimens have been analyzed with remains from the following mammalian groups recovered: Didelphidae (MNI=40), Leporidae (MNI=73), Soricidae (MNI=27), Rodentia (MNI=46), and Chiroptera (MNI=6). Avifauna (MNI=80) recovered represent at least seven families: Columbidae, Picidae, Sturnidae, Corvidae, Alaudidae, Cardinalidae, and Turdidae. The presence of GHO in Lyman Woods presents an opportunity to document their diet in suburban environments. Ongoing research will include

an analysis of seasonal variation and further identifications using additional skeletal elements.

P73 – COMPUTATIONAL ANALYSIS OF THE HYDROLYTIC STABILITY OF HETEROBOROLES BY VARYING THE NUMBER OF WATER MOLECULES

AUTHORS: Gallage KPA Ariyaratne[1], Dustin Gross[1] (1. Sam Houston State University)

ABSTRACT

Heteroboroles, five-membered rings containing boron and other heteroatoms, exhibit unique hydrolytic stability, contributing to the structural integrity and durability of materials like covalent organic frameworks. This study examines the thermodynamic properties of dioxa-, diaza-, and oxaza-boroles. Specifically, the Gibbs free energy and electronic energies are analyzed to assess these compounds' characteristics and predict their hydrolytic stability in the presence of one or two water molecules. Using density functional theory (DFT) with the B3LYP functional and 6-311G(d,p)++ basis set, geometric optimization and frequency calculations were performed in the gas phase. Synchronous transit quasi-newton (STQN) methods were used to identify transition states and intermediates during the hydrolysis. Our findings indicate that increasing water molecules from one to two lowers the energy barrier, likely due to the reduced ring strain in the transition state.

P74 – PARKING PREDICAMENT: A MICROECONOMIC ANALYSIS OF TECH'S PARKING SHORTAGE

AUTHORS: Affan Anas[1], Victoria Hang[1], James Kemper[1], Frederick Papazyan[1], Latchezar Popov[1], Patricia Schovanec[1] (1. Texas Tech University)

ABSTRACT

This study is a mathematical and microeconomic analysis studying monopolistic strategies and their consequences on an everyday trivial occurrence: parking. We aim to identify root causes for Texas Tech's notorious commuter parking shortage and use them to remodel sale strategies to not only maximize profits but to allow students an opportunity to find parking as well. Ultimately, we are over engineering the analysis of what is causing an everyday inconvenience and attempting to apply microeconomics, bayesian statistics, and other statistical analysis to create a solution.

P77 – EFFECTS OF CHINNABERRY ON FORAGING OF GULF COAST TOADS (INCILIUS NEBULIFER)

AUTHORS: Marion Mundy[1], Amy Lowe[1], Chris Distel[1] (1. Schreiner University)

ABSTRACT

Invasive species are known to reduce amphibian population sizes, but many mechanisms remain unclear. Melia azedarach, the Chinaberry tree, is a common, invasive, ornamental plant with insecticidal properties. Insects are the primary prey of adult anurans, including Incilius nebulifer (Gulf Coast Toad). Therefore, it can be inferred that the presence of invasive Chinaberry has a negative effect on the foraging success of toads due to a lack of prey available. We placed adult toads in enclosures with different Chinaberry treatments, which may repel or kill insects, and measured changes in toad mass over time. Toads in enclosures with only native plants experienced complete mortality due to fire ants, but toads housed with Chinaberry foliage or under Chinaberry trees did not. Similarly, tadpoles exposed to Chinaberry fruits did not experience substantial mortality, despite very low dissolved oxygen. These results are similar to previous work with other anuran species and reiterate the complex roles that invasive species can play in the ecological communities of amphibians within their native ranges.

P78 – THE LITTLE CHAMAELEON THAT COULD

AUTHORS: Adelle Cannon[1], Juan D. Daza[1] (1. Sam Houston State University)

ABSTRACT

Chameleons of the genus Brookesia are regarded as the smallest amniotes on Earth. While the cranial anatomy of this genus has been described, there have been no attempts to provide a detailed description of the skull that includes isolated bones. In this project, we explored the anatomy of Brookesia specimens using high-resolution computed tomography. This allowed us to render the cranial structure in detail and color-code each bone. The skull exhibits a very immature appearance, which may suggest that

miniaturization is associated with paedomorphism (the retention of juvenile traits into adulthood). Notable characteristics indicative of paedomorphism include a short snout, large orbital sockets, and a reduced jaw, despite the specimen being an adult. Additionally, we found the presence of extracranial endolymphatic sacs (ES) wedged inside the post-temporal fossa to be particularly interesting. This project will continue as my undergraduate thesis for my honors study.

P79 – PROGRESS ON SAURODACTYLUS (SQUAMATA: GEKKOTA: SPHAERODACTYLIDAE) CLASSIFICATION: ONE OR TWO GENERA

AUTHORS: Jayden Crew[1], Christopher Bell[2], Aaron Bauer[3], Juan D. Daza[1] (1. Sam Houston State University, 2. University of Texas at Austin, 3. Villanova University)

ABSTRACT

Saurodactylus is a genus of geckos from Morocco and currently includes 7 species. In all phylogenies based on molecular data, this genus is recovered as polyphyletic, indicating that it might represent two genera. In this project, we studied the skull anatomy of representatives from each group, totaling a number of 10 specimens from the species S. mauritanicus, S. brossetti, and S. fasciatus. Our analysis indicates that all members from S. fasciatus retain the squamosal bone, have a premaxilla that is short and pointed, and seems to have a frontal bone fused in adult stages. On the other hand, S. mauritanicus and S. brossetti they both have lost the squamosal bone, have a long and spatulated nasal process of the premaxilla, and have unfused frontals. We will continue evaluating these morphological traits in more specimens, and we are planning on including other sources of evidence that might help resolve the taxonomic status of Saurodactylus.

P82 – LOSE THE LICHEN: THE USE OF PHOTOGRAMMETRY IN EPIGRAPHIC DOCUMENTATION

AUTHORS: Aliyah Anderson[1], Nick Carter[1], Barb MacLeod[2], Jake Lozano[1] (1. Texas State University, 2. Independent Scholar)

ABSTRACT

We present an inexpensive and effective methodology for the archaeological documentation and clarification of partially eroded relief sculpture covered in lichen. A photogrammetric model of the sculpture is created in Agisoft Metashape, rendered in monochrome, and exported as an .OBJ file. The exported file is then imported into Blender, and virtual photographs of the carved surface are taken under simulated raking light. As an example of this method, we offer our model of an ancient Maya monument, Stela 4, from the archaeological site of Ixkun, Petén, Guatemala. The hieroglyphic inscription on Stela 4 is virtually illegible in person, but this technique permitted nearly the whole text to be read, revealing new and significant data about interpolity relations in the southeastern Maya lowlands at the end of the Late Classic period (AD 600–830). We propose our best interpretation of these data in their historical and cultural context.

P85 – PAX6 COLOCALIZES WITH ACTIN FILAMENTS IN HAIR CELLS

AUTHORS: Nisa Sindhi[1], Brittany A. Dobbins[2], Ruben U. Tovar[2], David M. Hillis[2], Thomas J. Devitt[2], Dana M. García[1] (1. Texas State University, 2. University of Texas at Austin)

ABSTRACT

PAX6 is a highly conserved transcription factor known for its roles in the development of eyes, the central nervous system, endocrine glands, and salivary glands in vertebrates and invertebrates. Recent findings have identified PAX6 localization within the mechanosensory neuromasts of the lateral line system in paedomorphic Eurycea salamanders (E. nana, E. sosorum, E. rathbuni, and E. latitans). Immunolabeling revealed intense PAX6 expression in the apical appendages of neuromast hair cells, thereby implicating a potential role of PAX6 within the cytoskeletal elements, as these appendages comprise microtubule-filled kinocilia and actin-filled stereocilia. We test for co-localization of PAX6 with filamentous actin (F-actin), using actin-labeling Alexa fluor 488-conjugated phalloidin and a polyclonal anti-PAX6 antibody to label PAX6 protein. Labels were detected using confocal microscopy. We observed partial co-localization of PAX6 and F-actin within the apical appendages. Preliminary image analysis supports the hypothesis that PAX6 interacts with the cytoskeleton. Ongoing efforts focus on quantifying the extent of co-localization in the apical region of neuromasts. These findings provide a foundation for understanding the relationship between PAX6 and the cytoskeleton; further studies are needed to clarify the functional significance of this interaction.

P86 – GENE EDITING: A NEW WAY TO TREAT BREAST CANCER

AUTHORS: Cheyenne Willis[1] (1. Mary Hardin-Baylor)

ABSTRACT

Breast cancer is the second most prevalent form of cancer diagnosed among women globally and is among the leading causes of female death. The heterogeneity of breast cancer characterized by genetic variations, presents challenges for radiation and chemotherapy in effectively suppressing cell division. Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR), is a revolutionary gene editing tool that allows scientists to make precise changes within the DNA sequence, alter specific genes, and enhance DNA repair. The CRISPR system comprises a Cas9 enzyme and a guide RNA allowing accurate genome editing. It is viewed as more practical in suppressing cell division in breast cancer than other gene editing techniques, such as ZFNs and TALENs, due to its ease of use, cost, and efficiency. This research aims to determine the application of CRISPR/Cas9 editing on specific mutated genes associated with breast cancer including BRCA1, BRCA2, HER2+, HER2-, OPN, and TP53 as a possible treatment for breast cancer. Studies have reported that the efficiency of gene modification in wild-type TP53 cell lines is lower compared to mutated TP53 cell lines. On the other hand, CRISPR/Cas9 can activate the p53 pathway within wild-type TP53 cell lines in response to DNA damage, leading to the initiation of DNA repair. Targeting of the remaining genes via CRISPR led to the inhibition of cell proliferation. This review revealed that CRISPR/Cas9 reduces cell proliferation within certain breast cancer tumor suppressor genes while enhancing TP53 cell line growth.

P88 – PREDATOR PREY SIMULATION

AUTHORS: Jeremy Becnel[1], Brenden Swope[1] (1. Stephen F. Austin State University)

ABSTRACT

We explore a predator-prey simulation using the Unity game engine. The simulation is designed as a turn-based dynamical system. In this environment, the animals follow standard mathematical formulas, while the user has control over various options, such as the number of prey, the number of predators, the turning radius, and the maximum distance traveled each turn. This project offers a valuable opportunity to study such systems in depth.

P90 – A NOVEL MACHINE LEARNING APPROACH FOR PREDICTING EVOLUTIONARY STAGES OF STARS

AUTHORS: Hitaishi Chillara[1] (1. High School)

ABSTRACT

We present a novel machine learning approach to predict the evolutionary stages of stars by utilizing their characteristics and current conditions. Stars undergo various stages in their life cycles, including the giant molecular cloud/nebula, protostar, T-Tauri phase, main sequence, red giant, helium burning, asymptotic giant branch, planetary nebula, white dwarf, and black dwarf stages. Traditional methods to predict these stages have limitations in accuracy and scope. Here, we show that by integrating radial velocity, angular momentum, radius, color indices, and other relevant features from astronomical datasets, our model can accurately predict the life cycle stage of stars. This innovative model can significantly outperform existing methods in precision and reliability. Our results reveal a more nuanced understanding of stellar evolution and offer a valuable tool for astronomers to better comprehend the complexities of star life cycles. By enhancing our ability to predict stellar stages, this study provides profound insights into the fundamental processes governing the universe's evolution. We anticipate this model will be useful for future research in astrophysics. This advancement not only contributes to the field of astrophysics but also paves the way for future applications in related disciplines.

P91 – GETTING A(HEAD) OF OURSELVES: ECTOPIC HEAD FORMATION FOLLOWING NERVE INJURY IN LUMBRICULUS VARIEGATUS

AUTHORS: Isabella Ortiz[1], Jake Garza[1], Veronica Martinez Acosta[1] (1. University of the Incarnate Word)

ABSTRACT

Lumbriculus variegatus is known for its remarkable capacity for regeneration. Using a paradigm where worms are induced to form ectopic heads along the body plan, we have determined that nerve cord damage is required for the induction of downstream regenerative events. These events include the emergence of giant interneuronal spiking which underlie the recovery of behavioral responses appropriate for the ectopic head's body position. In this study, we demonstrate that the emergence of ectopic heads is variable along the anterior – posterior body axis. Ventral lesions carried out between segments 6-11, just posterior to the head, resulted in ectopic head formation 6.66% of the time (n=15); while lesions carried out within segments 10-15 (n=3) and segments 15-20 (n=3) resulted in ectopic heads 33.33% of the time. Lesions carried out on the dorsal surface of the worm did not produce ectopic heads and instead resulted in would healing (100%, n=17). Interestingly some of the ectopic growths formed on the ventral surface of the worm contained both head and tail segments, suggesting that restoration of axial position is disrupted. Expression analysis of markers like the homeobox transcription factors or members of the wnt signaling pathway, as a part of our future studies, will help elucidate the signaling events which mediate the reemergence of anterior and posterior gradients of gene expression for the new axial position of the regenerating tissue.

P96 – COMPARATIVE ANALYSIS OF MOLECULAR IMPACTS OF SHORT-CHAIN PFAS EXPOSURE ON ABCG2 TRANSPORTER IN HUMAN CELL MODELS

AUTHORS: Gracen Collier[1], Ramon Lavado[1] (1. Baylor University)

ABSTRACT

PFAS are persistent chemicals present in the environment and consumer products that accumulate in living organisms and impact human health. Cellular changes include altering the expression of transport proteins like ABCG2, which is involved in drug resistance and metabolism. While PFAS have been shown to increase ABCG2 expression in liver cells, there's little data on their effects in other cell types. This study aimed to compare baseline ABCG2 expression in eight human cell lines and investigate how ABCG2 expression changes when these cells are exposed to low and high doses of selected short-chain PFAS. Here we show that 1nM and 1 µM concentrations of these PFAS alter ABCG2 levels differently in different human cell lines. The presence of ABCG2 in all cell lines evaluated was discovered, with highest expression in liver cells, and lowest in undifferentiated MSC. ABCG2 was shown to decrease with all treatments in breast cancer cells, while the protein increased with all treatments in colon cells. Our results demonstrate how low dose exposure to relevant PFAS may cause cellular changes to protein expression and transport activity, which have the potential to cause organ specific effects. Research into PFAS exposure in humans often focuses on large scale observable health effects in the liver and kidneys. However, PFAS interacts with proteins throughout the body. Our research highlights the need for more information on the many specific proteins which PFAS can affect, the impact of these changes, and how the regulation of such proteins is carried out.

P98 – DETERMINING THE EFFECT OF CONNECTIVITY ON COMMUNITY COMPOSITION OF POLLINATORS THROUGH POLLEN METABARCODING

AUTHORS: Erin Miller[1] (1. Austin College)

ABSTRACT

Habitat fragmentation can negatively impact pollinator drives by reducing plant diversity and limiting pollinators' foraging opportunities. One way to mitigate these effects is the use of corridors between landscapes, as this can increase the diversity and abundance of plant and pollinator communities. However, it remains difficult to quantify both plant-pollinator interactions and pollinator foraging diversity, making it challenging to determine the effect that connectivity has on these parameters. Current methods rely on visual surveys, which have limitations in determining the full scope of interactions. Alternatively, analyzing pollen samples from bees and eDNA samples from flowers through metabarcoding can offer a more comprehensive analysis of floral visitation, providing insight into the diversity and abundance of plant-pollinator interactions. This study seeks to identify the effect that connectivity has on community composition and foraging behavior of pollinators through the lens of pollen metabarcoding. Specifically, swabs of pollen from bees and eDNA from flowers in fragmented and connected landscapes will be collected to be sequenced. Results are expected to reveal the effect that connectivity has on pollinator and plant diversity in fragmented landscapes.

P99 – INTERFAITH INFORMATICS

AUTHORS: Yordanos Ayelework[1], Aravind Mohan[1] (1. McMurry University)

ABSTRACT

Religious misunderstandings often stem from a lack of interfaith awareness. This ignorance leads to conflicts among different religious groups. When people are limited to only one perspective, it could lead to stereotypes and make it hard to find common ground on critical topics; such as abortion, gun control, same-sex marriage, etc., which causes further division. Sharing perspectives, on the other hand, allows people to see the beliefs that guide different communities and identify the overlap between religions. In this project, we bridge the knowledge gap and provide a common perspective between the different religious communities such as Christianity, Hinduism, and Islam. Our platform, Interfaith Informatics, is a user-friendly web interface that helps people explore the perspectives of different religions on different topics. While existing literature has some work done in sharing perspectives on different religions, it is often limited in considering comprehensive data points and not able to provide a better perspective. In this project, we provide three primary features: 1) Information, which displays an overview of our comprehensive dataset that includes multiple sacred texts across religions; 2) Sentiment Analysis, which analyzes the general sentiment of a selected religion on a given topic; and 3) Comparison, which identifies the similarities and differences of the perspectives from two selected religions on a given topic. We used generative AI as a supporting resource for the interpretation and analysis of sacred texts. Finally, we conducted preliminary experiments to demonstrate the efficiency of our tool, which is developed using Web 2.0 and MySQL technology.

P107 – DISCOVERING NOVEL INHIBITORS FOR 3-OXOACYL-ACP-REDUCTASE (FABG) IN PLASMODIUM FALCIPARUM USING VIRTUAL SCREENING

AUTHORS: Mahdia Rahman[1], Hannah Thomas[1], Josh T. Beckham[1] (1. The University of Texas at Austin)

ABSTRACT

Malaria, caused by the protozoan Plasmodium falciparum, remains a devastating global health burden, with this parasite being responsible for the most severe and fatal cases. The emergence of drug resistance in P. falciparum highlights the need for new antimalarial therapies. This project aims to identify and characterize novel small inhibitors targeting ?-ketoacyl-ACP reductase (PfFabG), an essential oxidoreductase enzyme in the fatty acid biosynthesis (FAS-II) pathway of P. falciparum. PfFabG catalyzes the NADP-dependent reduction of ?-ketoacyl-ACP to ?-hydroxyacyl-ACP, a critical step in producing lipids required for membrane biogenesis and survival. By inhibiting PfFabG, this pathway is disrupted, making PfFabG an attractive therapeutic target. A homology model of the PfFabG from P. falciparum was generated and utilized for structure-based virtual screening of compound libraries (Hitfinder 9 from Maybridge, and in-house compounds - for a total of over 100,000 ligands)) via molecular docking using GOLD and ICM. Compounds with highest docking scores in each, as well as consensus hits, will be prioritized for experimental evaluation of binding to PfFabG using differential scanning fluorimetry (DSF) and inhibition of PfFabG enzyme activity through NADP reduction assays against the nickel purified protein that was produced via auto induction of BL21(DE3) E. coli competent bacterial cells. This integrated computational and experimental approach aims to discover potent and selective inhibitors of PfFabG as lead compounds for developing novel antimalarial therapies targeting the essential FAS-II pathway in P. falciparum. Ultimately, these efforts could contribute to addressing the pressing global health challenge of drug-resistant malaria caused by this deadly parasite.

P110 – PHENOTYPIC ANALYSIS OF ALLOPATRIC B. SUBTILIS STRAINS

AUTHORS: Nichole Cepeda[1], Robert Jonas[1] (1. Texas Lutheran University)

ABSTRACT

This study was undertaken to determine how the ability of B. subtilis to reproduce was affected as it lost its ability to sporulate over approximately 3000 generations after evolving in a lab setting. Growth of each strain was measured at 30 to 60 minute intervals and graphed on a semi-logarithmic graph. The doubling time was determined by drawing a line of best fit where exponential growth was shown and taking the slope. The doubling time of 4 strains of B. subtilis were determined over multiple growth curves using Tryptic Soy and LB Broth. Each strain's sporulation frequency was determined separately. Over time as the strains evolved, their ability to sporulate began to decrease.

P116 – DISTORTION OF SINGLE TRANSFERABLE VOTE ON A LINE

AUTHORS: Camille James[1], Barbara Anthony[1] (1. Southwestern University)

ABSTRACT

Voting is widely used to make decisions, not only in the familiar setting of elections, but also in numerous applications where computers are selecting from available outcomes. Even with the same set of ranked preferences from voters, the winning candidate may differ based upon the voting mechanism chosen. Understanding the performance of different mechanisms can inform both what mechanism is used in a given setting and how voters may choose to report preferences. Single Transferable Vote (STV) requires voters to list all of their preferences; if a voter's most preferred candidate is no longer viable, their (single) vote is transferred to their next most preferred choice. Such a mechanism may result in voters being more likely to provide their true preferences. We consider the performance of STV restricted to the line metric, where a voter's preferences are determined by the distance on the line from the voter to a given candidate. The social welfare of a given candidate is the sum of the distances between all voters and the candidate. The notion of distortion then captures the worst-case ratio of the social welfare of the optimal candidate compared to the winning candidate. We consider the distortion of STV on a line, investigating limiting factors in reducing the gap between the existing lower bound of 3 (Anshelevich et al., 2018) and upper bound of 15 (Anagnostides, Fotakis and Patsilinakos, 2022).

P120 – NOVEL SEXY ROLE OF PROLACTIN IN REGULATING EMT OF BREAST CANCER THROUGH CD44 SPLICING

AUTHORS: Reagan Farrell[1], Trevor Jones[1], Nicholas Pascuzzi[1], Ethan Chen[1] (1. Texas Tech University)

ABSTRACT

Epithelial–mesenchymal transition (EMT) is an early event in tumor invasion which causes cancer cells to become more aggressive in nature. Our previous studies discovered a new role of the hormone prolactin in regulating iron uptake by cancer cells through the surface protein, CD44. As CD44 is an important stem cell marker, we aim to investigate the expression of CD44 in guiding iron transport and manipulating metastasis of cancer stem cells. To date, there are 50 spliced variants with 27 being of use in protein translation but the role in iron uptake of CD44 still remains unclear. In this study, we hope to connect the correlation between iron-dependent EMT and CD44 splicing to get a better understanding of which variants are present in a prolactin induced environment. In two breast cancer phenotypes, MCF7 (Luminal A) and MDAMB 468 (Triple Negative Breast Cancer, TNBC) we observed upregulation of V3 and V5 isoforms following prolactin treatment. In MDAMB 468, bulk cultures expressed upregulation of V6 and V9. Similar gene expression analysis was continued in stem cell cultures. This led to the conclusion that cancer stem cells in a prolactin enriched environment had upregulation of V3 and V5 while having an overall increase of CD44 expression compared to bulk cells. Neutralization of CD44 V3 and V5 modulates both MCF7 and MDAMB 468 stem cells to an epithelial phenotype while reducing intracellular iron levels. In conclusion, this work provides a positive link between prolactin secretion, iron accumulation, and metastatic capabilities in breast cancer cells.

P121 – UPCYCLING ORANGE PEELS FOR SUSTAINABLE MONASCUS PIGMENT PRODUCTION

AUTHORS: Ian Konvicka[1], Md Ariful Haque[1], Seockmo Ku[1] (1. Texas A&M University)

ABSTRACT

The United Nations' FAO recently reported that agricultural food waste accounts for over 30% of global food production and 8-10% of greenhouse gas emissions. With the global food dye market projected to reach $7.58 billion by 2032, there is rising demand for natural, clean-label colorants. Monascus purpureus, a fungus in the Aspergillaceae family, produces vibrant pigments suitable for use as natural food dyes in red, orange, and yellow hues. This study investigates sustainable upcycling of agricultural waste, specifically orange peels, for pigment production through solid-state fermentation. Processed orange peels were sterilized and inoculated with M. purpureus spores but showed no growth, likely due to crusting and sugar degradation. We predict optimal growth using fresh orange peel with 60-65% moisture at 30°C. Future research will examine other agricultural wastes and bioreactor options to broaden the scope of upcycling through solid-state fermentation.

P122 – EVALUATING DIATOM-BASED CARBON FILTRATION FOR EMISSION REDUCTION IN CONTROLLED

ENVIRONMENTS

AUTHORS: Ethan Yager[1], Athenia Oldham[1] (1. University of Texas Permian Basin)

ABSTRACT

Diatoms, photosynthetic microalgae in aquatic ecosystems, show potential for mitigating carbon emissions due to their role in carbon cycling and nutrient management. This study aims to evaluate the carbon-filtering efficacy of diatoms within controlled environments that simulate urban and industrial ecosystems. By introducing diatoms into closed systems (i.e. bioreactors) with varied carbon concentrations, this research will assess whether diatoms can reduce carbon levels to counteract human-generated emissions. Key indicators include reductions in carbon concentration, and/or proportional diatom growth. Positive results would demonstrate diatoms' ability to filter and utilize excess carbon for biomass, promoting atmospheric health. Conversely, minimal carbon reduction, stagnant diatom growth, would indicate the limitations of diatoms in this capacity. If successful, future steps would include scaling up experiments and optimizing conditions for real-world applications. Otherwise, research may shift toward alternative carbon-capture organisms. This exploration of diatom-based carbon capture could contribute to sustainable emissions management and cleaner environments.

P124 – ACETATE FORMATION FROM VARIOUS ALKENES: AN UNDERGRADUATE ADDITION REACTION LABORATORY

AUTHORS: Saira Sitgreaves[1], Benjamin Wisser[1], Bruce Hathaway[1], Scott Morris[1] (1. LeTourneau University)

ABSTRACT

Addition reactions to alkenes is an important topic discussed in organic chemistry courses where students are tasked with understanding and combining a variety of challenging concepts. In a typical addition reaction, a ? bond from an unsaturated molecule (such as an alkene) reacts with another molecule (acid or electrophile), ultimately allowing for the addition of new atoms/groups across the ? bond. When discussing these reactions, students are typically taught topics that are difficult to grasp, such as Markovnikov's rule, carbocation rearrangements, and various stereochemical considerations. Therefore, it is critical that the topics discussed in lecture are reinforced in a hands-on laboratory experience. While there are numerous examples of undergraduate laboratories focused on addition reactions to alkenes (hydrations, hydrohalogenations, halogenations, etc.), we present an addition reaction that is not commonly taught in textbooks: adding a carboxylic acid over an alkene. In this laboratory development, we demonstrated that several commercially available alkenes readily undergo an addition reaction with acetic acid using low-medium heat. This laboratory can be finished in two laboratory sessions (3 hours each), which includes characterization of the adducts. Benefits to students include: a simple experimental procedure; using FTIR and >1>H NMR to verify the presence of the ester; evaluating purity and identifying products by GC-MS; and providing experimental evidence for carbocation rearrangements. Overall, this laboratory has potential to benefit many universities seeking a non-traditional addition reaction experience that helps reinforce these vital concepts.

P133 – COMPARATIVE MITOGENOME ANALYSIS OF TRUE TOADS (G: ANAXYRUS)

AUTHORS: Ciara E. Moroney[1], William I. Lutterschmidt[2], Matthew J. Greenwold[1] (1. University of Texas at Tyler, 2. Sam Houston State University)

ABSTRACT

Mitogenomes are the complete sequence of mitochondrial DNA, which is generally inherited maternally. Comparative analyses of mitogenomes can be used to study the evolution of mitogenomes and their component genes between species. Currently, there is only one complete mitogenome (American toad; Anaxyrus americanus) for toads in the genus Anaxyrus publicly available on the National Center for Biotechnology Information (NCBI). With one of the Anaxyrus species, Anaxyrus houstonensis (Houston toad), being listed as an endangered species in 1973, a comparative analysis of the diversity of Anaxyrus mitogenomes may be useful in conservation efforts. Here we have sequenced the mitogenomes from six different toad species including Anaxyrus debilis, Anaxyrus cognatus, Anaxyrus houstonensis, Anaxyrus punctatus,Anaxyrus speciosus, and Anaxyrus woodhousii. In total, we analyzed the mitogenomes of eight toad species including the American toad and an outgroup, Bufo bufo, which were both downloaded from NCBI. We assembled six novel Anaxyrus mitogenomes using the pipeline Mitofinder. The size range of the mitogenomes varies between 17,328-17,865 bps. The number of protein-coding genes and tRNAs for all species was thirteen and

twenty-one, respectively. We also analyzed the relationship among these eight species using a maximum likelihood phylogeny of the thirteen protein-coding genes using Bufo bufo as the phylogenetic outgroup. Finally, we characterized the nucleotide diversity and dN and dS values of the protein-coding genes. We anticipate these mitogenomes will be useful for conservation efforts such as the development of noninvasive eDNA sampling methods that can detect the presence of one or more Anaxyrus species.

P135 – SYNTHESIS OF METHOTREXATE LOADED POLY L-LACTIC ACID COMBINED WITH A HYDROGEL FOR TREATMENT OF RHEUMATOID ARTHRITIS

AUTHORS: Areej Khodair[1], Milka Montes[1] (1. The University of Texas Permian Basin)

ABSTRACT

The research topic has been selected in order to investigate a more stable form of treatment for rheumatoid arthritis (RA) that does not pose as many detrimental complications as other available treatments for RA. With present day treatments, many medications usually cause adverse reactions that can lead to serious injuries or permanent health issues. This is why it is important to find anti-inflammatory medicine that proves to be less harmful to people suffering from RA. One form of treatment that imposes less of a risk are hydrogels which have characteristics that aid in drug delivery applications and maintaining the effect of a drug. Another form of treatment that proves to be more beneficial in dealing with RA are polymeric nanoparticles which help not only deliver drugs directly to target sites but also help in keeping the drug stationary where it's needed. With the combination of the two, drug loaded nanoparticles combined with hydrogels can be an effective form of treatment for RA. One way this can happen is that hydrogels will help the nanoparticles to not degrade as often as they do, while the polymeric nanoparticles will allow for the properties of the hydrogel to be strengthened. For the methodology of this study, the solvent evaporation method will be used. This scientific experiment was created as an explorative project to optimize the synthesis of encapsulated Methotrexate (MTX) loaded Poly L-lactic acid (PLLA) combined with a hydrogel for treatment of Rheumatoid Arthritis efficiently. The results from this experiment will be presented.

P136 – MINIMIZING CITRININ IN MONASCUS PURPUREUS FERMENTATION

AUTHORS: Khadija Ayesha[1], Lakshmi Devi Chittepu[1], Md Ariful Haque[1], Seockmo Ku[1] (1. Texas A&M University)

ABSTRACT

Monascus purpureus, a filamentous fungus known for its biocolorant properties, has been widely used in Asian cuisine for color and preservation, though it may also produce citrinin, a compound with potential toxicity. This study attempted to optimize biocolorant production using M. purpureus ATCC 16315 under submerged fermentation to minimize citrinin contamination, targeting applications in food coloring and meat preservation for both aesthetic and antimicrobial benefits. The fungus was cultivated in a defined medium at 28°C for 15–20 days, yielding substantial pigment levels, with absorbance ranges of 0.686–1.826 OD at 400 nm, 0.326–1.248 OD at 475 nm, and 0.259–1.127 OD at 500 nm. Quantitative analysis showed promising results with significant pigment production (red: 27.74±0.52 AU, orange: 35.34±5.21 AU, yellow: 26.86±0.48 AU) and low citrinin levels (intracellular: 2.37±0.088 ppm, extracellular: 0.522±0.061 ppm), supporting safe food applications. Future work will focus on enhancing pigment yield and further reducing citrinin through optimizing parameters for industrial production.

P137 – USING THERMAL IMAGING TO INVESTIGATE DIFFERENCES BETWEEN BODY TEMPERATURE AND SURROUNDING MICROHABITAT TEMPERATURE IN A FREE-RANGING ECTOTHERM

AUTHORS: William I. Lutterschmidt[1], Jenna E. Brue[1] (1. Sam Houston State University)

ABSTRACT

We used a FLIR® Ex Series infrared thermal imaging camera to collect body temperatures (T_b) and surrounding environmental temperatures (T_e) within the microhabitats used by free-ranging garter snakes (Thamnophis sirtalis). Here we present a detailed methodology for discussion on how to best quantify the potential differences between T_b and T_e within each thermal image. These discussions will inform future data collection and analyses to be used in more theoretical investigations for how individual snakes within group mating balls can potentially maintain higher T_b than surrounding T_e during mating, but non-active behavioral thermoregulatory.

P138 – MICROBIAL AND SACCHARIFICATION DYNAMICS IN DEVELOPING SUSTAINABLE SORGHUM MAKGEOLLI

AUTHORS: Marianne Howell[1], Elizabeth Campbell[1], Min Ji Jang[1], Md Ariful Haque[1], Samuel Haruna[2], Seockmo Ku[1] (1. Texas A&M University, 2. Middle Tennessee State University)

ABSTRACT

Makgeolli is a traditional Korean rice wine made from rice, water, and nuruk. With the growing international popularity of Korean foods, there is rising demand for sustainable ingredients and production methods. While rice requires significant water as an annual crop, perennial sorghum, which helps prevent soil erosion, offers a more sustainable alternative. Sorghum is challenging to convert into fermentable sugars due to tannins, making the choice of saccharification agent critical. To identify the best saccharification agent and observe microbial changes during fermentation, we compared microbiome profiles in sorghum-based makgeolli made with nuruk and koji. Nuruk makgeolli showed a high concentration of lactic acid bacteria, beneficial for gut health. Two DNS assays will assess enzyme activity on sorghum paste and track reducing sugars over 10 days to find the optimal agent for alcoholic fermentation. Sustainable sorghum-based makgeolli could support eco-friendly production.

P139 – INVESTIGATING CARBON SOURCE EFFECTS ON FUNGAL CELLULOSE PRODUCTION FROM RED YEAST RICE

AUTHORS: Paulina Sandoval[1], Anishka Talari[1], Md Ariful Haque[1], Seockmo Ku[1] (1. Texas A&M University)

ABSTRACT

Cellulose production through fermentation has traditionally been associated with bacterial sources, while fungal cellulose remains a rare and relatively unexplored area of study. This study examines how specific carbon sources can induce carbon catabolite repression, thereby modulating the production of microbial metabolites. To achieve this, we will apply two primary variables: observing changes in cellulose production based on the carbon source in the medium and the effects of varying pH levels. In future studies, we will also measure cellulose production based on changes in nitrogen sources in the medium. The data obtained will be used for optimization analysis through response surface methodology, allowing us to propose the optimal conditions for cellulose production.

P140 – MICROBIAL DYNAMICS AND PROBIOTIC POTENTIAL OF LACTIC ACID BACTERIA IN TRADITIONAL KOREAN MAKGEOLLI

AUTHORS: Yu Jeong So[1], Min Ji Jang[2], Seockmo Ku[2], Yunju Jeong[1] (1. Kyunghee University, 2. Texas A&M University)

ABSTRACT

Makgeolli made from glutinous rice and wild nuruk showed an increased alcohol content (%), decreased Brix (%), and stable pH during an 11-day fermentation period. The pH decreased during refrigeration, suggesting continued microbial activity. The microbial community changed dynamically throughout fermentation, with key roles played by Lactobacillus and Weissella—two lactic acid bacteria that are potential probiotics. Weissella numbers decreased early in fermentation, but this became the

dominant genus by day 11, whereas Lactobacillus, initially present at a high relative frequency (%), significantly declined by day 3 and maintained a low relative frequency through day 11. The presence of these lactic acid bacteria suggests that Makgeolli may harbor probiotics beneficial to human health.

P141 – ADDING WORMS TO AN AQUAPONIC SYSTEM: IMPACTS ON PLANT GROWTH

AUTHORS: Alice Conely[1], Matthew Allen[1] (1. Wayland Baptist University)

ABSTRACT

Aquaponics is an integrated system of plant and fish farming that can be a more cost-effective solution to traditional production methods and is seen to be more environmentally friendly. Incorporating worms into an aquaponics system, also known as vermiponics, is hypothesized to improve plant performance, but lacks supporting research. Since worms consume dead organic matter, and redeposit it in useable forms, vermiponics has the potential to increase nutrient retention in the system as well as improve plant productivity. In this study, red wiggler (Eisenia fetida) worms were added to an aquaponic system to test their effect on the growth of eggplants (Solanum melongena). The system consisted of a 300-gallon fish tank with Nile tilapia (Oreochromis niloticus) connected to four 40-gallon media beds filled with clay pebbles. The tank was also connected to eight automatically watered pots filled with a mixture of soil and clay pebbles. The worms were distributed in half of the media beds and half of the pots to assess their effect on plant development. Growth indicators such as plant height, leaf count, and canopy coverage were measured weekly, with fruit yield recorded at the study's end. Contrary to expectations, plants in beds with worms grew more slowly and produced fewer fruits than those in worm-free environments, suggesting that worm presence may inhibit growth. These findings indicate that the benefits of vermiponics for vegetable production may be more complex than anticipated, warranting further research into optimal conditions for combining worms with aquaponics.

P143 – CELLULAR UPTAKE AND CYTOTOXICITY OF MICRO AND NANOPLASTICS

AUTHORS: Alisha Janiga-MacNelly[1], Tham Hoang[2], Ramon Lavado[1] (1. Baylor University, 2. Auburn University)

ABSTRACT

Micro and nanoplastics (MNPs), plastic particles in the micrometer and nanometer size range, are ubiquitous in water, air, soil, and biological tissue. Despite their widespread presence, the mechanisms of cellular uptake and the toxicity profiles of MNPs are not well understood. This study examines whether different cell types internalize MNPs and whether they exhibit uniform cytotoxic responses to these particles. Here, we demonstrate that the rate of MNP uptake and their cytotoxicity depend on both cell type and particle size. Specifically, microglial and endothelial cells preferentially internalize 0.25 µm particles and are more susceptible to MNP-induced toxicity compared to colorectal cells and keratinocytes. Furthermore, co-exposure with cytochalasin reduces MNP uptake in endothelial cells, indicating endocytosis as a likely uptake mechanism. These findings reveal substantial variation in sensitivity and uptake among cell lines and particle sizes. This research enhances our understanding of MNP interactions at the cellular level, emphasizing cell-specific responses and mechanisms of action. Future studies, such as analyzing endocytosis-related gene and protein expression, and employing in vivo exposure models, could further elucidate the toxicity mechanisms and risk of MNPs in biological systems.

P144 – EFFECTS OF TEMPERATURE ON THE FECUNDITY OF SECONDARY CAVITY NESTERS AT THE UNIVERSITY OF TEXAS AT TYLER

AUTHORS: Gwendolyn J. Bouse[1], Jessica L. Coleman[1], Matthew J. Greenwold[1] (1. University of Texas at Tyler)

ABSTRACT

Avian secondary cavity nesters utilize pre-existing cavities such as trees, barns, homes, birdhouses, or other structures for nesting. Anthropogenic changes to the landscape are increasing, and the availability of suitable nesting sites has become a more prominent factor in the survival and reproduction rates of various avian species. Artificial nesting sites have become increasingly common to create suitable living conditions for these avian species and help maintain healthy populations. Nestboxes are effective in providing shelter, but they have also been associated with heat-induced mortality. We monitored twenty artificial nesting sites (nestboxes) across the University of Texas at Tyler for three breeding seasons to observe the effects of urbanization and other anthropogenic factors on secondary cavity nesters. These boxes were placed in different habitats, including open area,

water proximity, and forested habitats. We found that the next boxes were used primarily by Eastern Bluebirds (Sialia sialis) and, to a lesser degree, Carolina Chickadees (Poecile carolinensis). Statistical tests will be performed to determine if elevated ambient temperatures in the warmer months negatively affect nest success of secondary cavity nesters using nestboxes. Preliminary results of this study may provide insight into the effect of ambient temperature on clutch survivability.

P154 – STRUCTURAL PROPERTIES OF LANTHANIDE ALKALI METAL SULFATES, MLN(SO4)2(H2O)X

AUTHORS: Thomas Hodge[1], Jackson Turner[1], Ralph Zehnder[1] (1. Angelo State University)

ABSTRACT

Lanthanides are frequently used as stand-ins for highly radioactive actinides in f-element chemistry due to the similar chemical properties and ionic radii between trivalent 4f-elements and their 5f analogs. This similarity enables lanthanide reactions to be adapted and optimized for studies involving transuranic actinides, which are challenging to work with directly. To support this approach, we have expanded our collection of lanthanide coordination polymers to develop comparable methods for synthesizing trivalent transuranium compounds. Our recent hydrothermal syntheses yielded several lanthanide alkali metal sulfates, MLn(SO?)?(H?O)?, where M = K, Rb, Cs; Ln = Pr, Nd, Sm; and X = 0 or 4. These compounds may have relevance in identifying materials that could serve as nuclear waste matrices due to their stability in aqueous environments.

P155 – A LANTHANUM GLUTARATE BROMOTEREPHTHALATE COMPOUND WITH UNIQUE STRUCTURAL PROPERTIES

AUTHORS: William Best[1], Emory Brandon[2], Daniel Rios[2], Ralph Zehnder[2] (1. Baylor University, 2. Angelo State University)

ABSTRACT

We developed a synthetic method to create lanthanide coordination polymers with the formula Ln?(Glut)?(TP)(H?O)?·4H?O (Ln = La, Ce, Pr, Nd), forming a series of isomorphous frameworks previously reported. Upon room-temperature drying, single crystal X-ray diffraction confirmed that the structural integrity of the Ce, Pr, and Nd analogs was preserved, whereas the La analog underwent a notable structural rearrangement, which is the focus of this presentation.

P156 – MACROORGANISM ASSOCIATIONS AND HEALTH STATUS OF DEMOSPONGIAE SPECIES IN ROATÁN, HONDURAS

AUTHORS: Cambria Blanton[1], Caden Helona[1], Naomi Hammond[1], Ashlynn Kennedy[1], Jacqueline Dove[1], Anne Mowry[1], Traesha Robertson[2], Stephanie Randell[1], Stephanie Lockwood[3] (1. McLennan Community College, 2. College of Coastal Georgia, 3. Texas Tech University)

ABSTRACT

Sponges are some of the most prevalent and vital members within coral reefs. Some poriferan species possess a spongocoel and large protuberances, which provide refuge for marine organisms. Demospongiae species such as Callyspongia vaginalis, Callyspongia plicifera, and Xestospongia muta are notable for these features. Associations between sponges and macroorganisms are generally incidental or opportunistic. However, interactions between brittle stars and poriferans can be mutualistic to parasitic. The association between macroorganisms and sponges and sponge health is unknown. This study examined macroorganism associations and health status for Demospongiae species in Roatán, Honduras in May 2024. No X. muta were found damaged and more macroorganisms were associated with this species, such as fish, crabs, and shrimps. One sponge alone hosted about 130 fish. Of note, were seven juvenile threespot damselfish, a species known for exclusively dwelling among staghorn corals. Approximately 62% ($p<0.001$) of X. muta were algae fouled or infected with White Spot or Orange Band Disease. Over 75% ($p<0.001$) of C. vaginalis were healthy, but 61.9% ($p<0.001$) of those containing brittle stars had open lesions. Several C. vaginalis also hosted crustaceans and fish. All C. plicifera observed were healthy and had no macroorganisms present. This study identified more macroorganisms associated with smaller osculum diameters. This data differs from previous Bay Islands research, which found a positive correlation between osculum size and the presence of macroorganisms. We anticipate this research will create a foundation for future studies for sponge health and macroorganism associations.

P157 – LIVER MORPHOLOGY IN GLIDING AND NON-GLIDING GECKOS

AUTHORS: Lynsey Haynes[1], Juan D. Daza[1] (1. Sam Houston State University)

ABSTRACT

The liver is an important organ of the abdominal cavity and performs many important metabolic functions. The liver is critical for producing metabolic fuel to other tissues, especially while the organism is performing locomotion. In this project, we want to test if animals with contrasting morphology and locomotive activity (exclusive arboreal vs gliding), will show differences in liver morphology and volume. We use DiceCT data for lizards in the genus Gekko to render 3D models of the liver and compare the data between the two groups. We expect the lizards with a more passive mode of locomotion (i.e. gliding) will exhibit a smaller liver volume. Losing volume in internal organs could be advantageous for reducing weight, inclusive in flying tetrapods.

P158 – INVESTIGATING FERMENTATION AND PROBIOTIC PROPERTIES OF AMERICAN KIMCHI WITH 100% U.S.-GROWN CROPS

AUTHORS: Sehyeon Song[1], Maddie Shults[1], Min Ji Jang[1], Seockmo Ku[1] (1. Texas A&M University)

ABSTRACT

Kimchi, a staple of Korean cuisine, has been enjoyed for over 1,500 years for its distinctive flavors and probiotic benefits derived from natural fermentation. Although kimchi's popularity has recently surged in the U.S., no comprehensive study has yet examined a version made entirely with 100% U.S.-grown crops. This study introduces an American-adapted kimchi crafted with U.S.-grown ingredients to investigate how these elements influence fermentation, probiotic potential, and flavor. Over a four-week period, pH, acidity, and microbial content were analyzed. Initial findings indicate that American kimchi, using a unique chili powder, was saltier, had a lower maximum pH, and exhibited reduced acidity compared to traditional Korean kimchi. A non-spicy version, White American Kimchi, displayed pH and acidity profiles closer to those of Korean kimchi but without the heat. Using next-generation sequencing microbiome analysis, we will compare the microbial species composition of both versions, aiming to provide insights into the fermentation characteristics and potential health benefits of American kimchi.

P162 – ZOONOTIC RISKS IN TOURIST HOTSPOTS: THE CRITICAL NEED FOR EDUCATION ON SAFE HUMAN-ANIMAL INTERACTIONS

AUTHORS: Elea Vander Burgh[1] (1. Baylor University)

ABSTRACT

Zoonotic diseases are pathogens transmitted from non-human animals and humans. In high-tourism areas where human and animal interactions are frequent, these interactions increase the risks of zoonotic pathogen spillover. Examples include SARS-CoV-2 virus, avian influenza, rabies, and much more. This study examines human-animal interactions in the Galapagos Islands, observing tourist behavior such as petting or approaching wildlife–including seals, turtles, sharks, tortoises, and stray domesticated animals. These behaviors reveal a lack of awareness about the risk of zoonotic diseases associated with close contact, highlighting an educational gap that could lead to future pandemics. Here, I demonstrate that the lack of effective educational programs addressing zoonotic disease risk endangers public health and threatens endemic wildlife. Using survey data from Ecuadorian residents and visiting tourists, the study identifies that, while survey participants recognize the risks of animal-to-human disease transmission, they are less aware that they can transmit diseases to animals. My goal is to address the absence of effective educational programs addressing zoonotic disease risks in tourist regions, especially in regions where human-to-animal interaction is almost unavoidable. I anticipate that this essay will show how even in educated communities, there is this overall belief that humans cannot spread their own pathogens to an animal. By addressing this knowledge gap, I aim to impact the educational strategies in ecologically sensitive, high-risk areas in order to increase more responsible human behavior in eco-travel regions and reduce the potential for zoonotic disease transmission.

P163 – FLAVONOID'S INFLUENCE ON AMYLOID BETA PEPTIDE AGGREGATION

AUTHORS: Imani Harris[1], Robert Friedfeld[1], Bidisha Sengupta[1] (1. Stephen F. Austin State University)

ABSTRACT
Flavonoids are polyphenolic compounds synthesized from phenylalanine that are commonly known for their role in plant pigmentation in flower petals. Recent literature data has identified that flavonoids possess properties that are antioxidant, anti-inflammatory, anti-mutagenic, and anti-carcinogenic properties. Due to senescence, Alziherms disease can begin developing with improper proteolytic cleavage of Amyloid Precursor Protein (APP) by ?-secretase and ?-secretase at its amino-terminus and carboxyl-terminus. However, some cases can be Familial Alziherms Disease (FAD) and autosomal dominant inheritance of the mutation APP and two other similar genes presenilin 1 (PS1) and presenilin 2 (PS2) altering ?-secretase activity, affecting the breakdown of APP. This leads to the accumulation of A?40 and A?42 senile plaques and neurofibrillary tangles (NFT)being predominant indicators of Alzheimer's Disease. Recent literature has explored how flavonoids may influence the structural conformations of ?-sheet folds, by converting them into random coil structures, producing less toxic aggregates in neurons, and structurally configuring A? protofilaments resulting in the termination of toxic fibril formation. Focusing on natural product therapeutics allows for the identification of potential therapeutic compounds from fruits, vegetables, and other photosynthetic organisms that could help relieve symptoms of Alzheimer's disease and incorporate healthier chemical alternatives. Our time dependent (20 days) studies using circular dichroism and fluorescence spectroscopy as well as atomic force microscopy suggest useful anti-aggregating activities of plant flavonoid kaempferol and its glucoside and rutinoside derivatives for A?42 peptide.

P165 – EGG SIZE VARIATION IN CAROLINA WREN CLUTCHES

AUTHORS: Kendra Rodrigue[1], Stefano Cavezza[1], Diane Neudorf[1] (1. Sam Houston State University)

ABSTRACT
Female songbirds can control the sizes of their eggs and egg size indicates their level of investment in their offspring. When considering the availability of resources between different environments, a mother may choose to invest more into her eggs either earlier or later during her laying period. The last egg may hatch later than earlier laid eggs, so that last egg may be bigger to ensure that offspring has a better chance of surviving. The Carolina Wren (Thryothorus ludovicianus) is an insectivorous songbird widespread in the southeastern United States. They are cavity-nesters who lay one egg per day, usually in the morning hours. We set up nest boxes in urban and rural environments near Huntsville, TX in the 2024 breeding season and we measured wren eggs as they were laid. Only full clutches of 4 to 6 eggs were analyzed. We compared egg size between first and last egg for both habitats using paired t-tests. The last laid eggs in full clutches were significantly larger than the first eggs laid suggesting females compensate for size differences in the last hatched chick.

P167 – COMPARATIVE ANALYSIS OF FOOD-INDUCED AGGRESSION IN DROSOPHILA SPECIES WITH VARYING DIETARY PREFERENCES

AUTHORS: Laurie Neuman[1], Dainet Arencibia[1], Juan Magadan[1], Tammy Duong[1], Yuan Yuan Kang[1] (1. University of Houston-Downtown)

ABSTRACT
In their native ecosystems, animals display aggressive behaviors to secure access to food, mates and territory. These are stereotypical behaviors that can be effectively modeled under laboratory-controlled conditions. Our research focuses on food-induced male aggression in Drosophila species, which are extensively researched and well-defined. Specifically, we compared the aggression levels between two food generalists (D. simulans and D. melanogaster) and a food specialist (D. sechellia), a species that inhabits various islands and exhibits high preference for noni (Morinda citrifolia L) fruit. We hypothesized that the levels of expression in aggressive behavior would depend on the food-type presented to each species, influenced by factors such as odor, taste and nutritive value. We tested this hypothesis by isolating socially naïve male flies from different Drosophila species, loading them into fighting arenas with differing food sources and observing their behavioral outcomes. Pairs were recorded for sixty minutes, and specific aggressive actions (chasing, fencing, lunging) were analyzed on and off the food column. Our results revealed different levels of aggression in the food specialist compared to the two generalist species. Specifically, we found a clear trend of higher aggression levels when D. sechellia was given noni food, consistent with what we expected from food specialists. We further investigated whether this increased aggression on preferred food was subject to epigenetic modification. Our studies provided evidence to fill the gap of knowledge regarding aggression in non-melanogaster Drosophila species and provide insights into how different Drosophila species may have adapted their behaviors in competing for food sources.

P168 – EXPERIMENTAL TEST OF PREDATOR ODOR DETECTION IN A CAVITY-NESTING SONGBIRD

AUTHORS: Anna Maloney[1], Kendall Kinsey[1], Diane Neudorf[1] (1. Sam Houston State University)

ABSTRACT

Some studies have found olfactory recognition of nest predators, in cavity-nesting songbirds. To understand Carolina wrens' (Thryothorus ludovicianus) olfactory predator recognition, a cavity-nesting songbird of the southeastern USA, we examined their ability to detect odors of a common nest predator, the raccoon (Procyon lotor). Experiments were conducted in an urban area (Huntsville, TX) and in a rural area (Pineywoods Environmental Research Lab) in the 2022 to 2024 breeding seasons. In our first experiment, we exposed incubating female wrens to odors placed in their nest boxes. We measured hesitation time to enter the nest box as a measure of odor recognition. We compared responses to control odors: water, orange extract, or garlic extract. We did not find a significant difference in hesitation time between the control and raccoon odors in either habitat, suggesting wrens did not recognize the predator odor as a threat. In our second experiment, we treated pairs of nest boxes placed 2 m apart with either water or raccoon odor in both urban and rural environments. In the 2023 breeding season, 10 pairs were placed only in the rural areas while 15 pairs in both environments were studied in 2024. We predicted wrens would avoid nesting in the nest boxes treated with the raccoon odor, but our prediction was not supported. In conclusion, Carolina wrens do not perceive raccoon odor as a threat, or they do not detect the odor.

P172 – PLANKTON COMMUNITIES OF COASTAL HABITATS IN ROATAN, HONDURAS

AUTHORS: Aero Warren[1], Harrison Wolf[1], Annie Mowry[1], Traesha Robertson[2], Stephanie Lockwood[3], Jacqueline Dove[1], Stephanie Randell[1] (1. McLennan Community College, 2. College of Coastal Georgia, 3. Texas Tech University)

ABSTRACT

Plankton are organisms suspended in the water column and moved by currents. These organisms are divided into two groups based on nutrient acquisition: photosynthesizing phytoplankton and heterotrophic zooplankton. Abundance of plankton in coastal seagrass and reef habitats contribute to the production levels of these ecosystems. Diversity and abundance of plankton can have many influences including phytoplankton concentration, predation pressure, and environmental factors such as weather patterns and climate change. Climate change projections show a decline in phytoplankton which causes zooplankton abundance to decrease. Marine ecosystems will support less organisms as primary production decreases. Their place at the base of the food chain and short life cycles allow zooplankton to be indicators of climate change's effects on entire marine ecosystems. Due to lack of current studies along the Mesoamerican Barrier Reef, this study was conducted to assess diversity and abundance in coral reef and seagrass communities. Plankton samples were collected with a plankton net from a seagrass meadow close to shore and near the reef while diving. Subsamples were analyzed under a microscope and counted and categorized into broad groups based on commonality and function. Copepods (p-value = <0.001) were the most abundant group found in seagrass and protozooplankton (p-value = 0.011) were the most abundant group found on the reef. Phytoplankton densities were similar, but the type varied with diatoms being most common in seagrass and cyanobacteria most common in reef. Future studies should expand to include mangrove sample sites and separate times within the diel migration cycle.

P173 – DEVELOPMENT OF MODIFIED MEDIA FOR ENHANCED FUNGAL CELLULOSE PRODUCTION

AUTHORS: Gianmarco Frau[1], Md Ariful Haque[1], Lakshmi Devi Chittepu[1], Anishka Talari[1], Seockmo Ku[1] (1. Texas A&M University)

ABSTRACT

Microbial cellulose, derived from bacterial sources, stands out from plant-based cellulose due to its unique crystallinity, cellular structure, and adaptability in production, broadening its industrial application spectrum. These properties make microbial cellulose a promising material for food applications, such as edible casings and coatings, and biomedical uses in wound dressings, filtration systems, and tissue engineering. Specifically, fungal cellulose from red yeast rice fungus may offer a sustainable alternative to non-biodegradable plastics like polyethylene by enabling the production of films and composites for packaging and single-use items. This study examines the potential of red yeast rice fungus to produce fungal cellulose under controlled media conditions, systematically varying nutrient sources, particularly nitrogen. The results shed light on how media composition affects fungal cellulose yield and properties, supporting its industrial viability and contributing to more efficient, sustainable production methods.

P177 – FLORAL DIVERSITY AND FUNCTION IN THE UPPER LEON CREEK GREENWAY

AUTHORS: Annie D'Arcy[1], Jeffrey Hutchinson[1] (1. The University of Texas at San Antonio)

ABSTRACT

Floral diversity is important for any ecosystem and can help our understanding of the important functions of riparian and terrestrial ecosystems. A flora study was conducted within the Upper section of Leon Creek Greenway which is an ephemeral stream with isolated pools. The stream and pools are often dry and only flow following a rain event. The study area was periodically surveyed each week using a non-systematic survey from February 2023 to May 2024. The survey was conducted 5 days a week over 16 months with an average survey distance of 1,200 meters. 295 samples were identified by common and scientific names. The USDA plant database was then used to further categorize and define growth form, life cycle, wetland status, group, and native status. Data was organized and analyzed using Excel and RStudio, which allowed for categorization and analysis of the species richness and functional diversity. Preliminary results found that 83.2% of the species were native. The study further found that based on the USDA Wetland Classification system, 53.9% of the species were classified as upland species, and only 1.3% were classified as obligate wetland species. Additionally, 67.7% of the species were dicot and 29.7% were monocot. The majority were characterized by forbs/herbs group at 50.2% while the smallest group was vine at 6.1%. Graminoids accounted for 28.5% of the species documented. Further analysis will be conducted and presented at the conference. Understanding the biodiversity makeup of habitats can give us better insight into their function and important processes.

P179 – USING LICHENS AS BIOINDICATORS FOR ANALYZING AIR QUALITY IN CENTRAL TEXAS

AUTHORS: Jack Luckey[1], Chad Cryer[1] (1. Temple College)

ABSTRACT

Lichens are a fungal organism that forms a mutualistic relationship with algal cells or cyanobacteria. Lichens have been found to grow on many surfaces because lichens don't extract anything from these surfaces, rather they absorb all the nutrients and moisture they require directly from the air. For this reason, they are natural indicators of air quality. However, Texas's low percentage of public land provides a unique challenge to studying lichen diversity, resulting in little if any historical data on this topic. In this study, we've identified several tree species that we could find in five distinct sample locations across Central Texas. These sample locations cross areas of various population densities and agricultural activity. Multiple lichen samples are taken in each sample location for each tree species. We present values of lichen species richness, per tree species, and per sample area. Our data suggest that lichen diversity is in fact sensitive to air quality, with a sharp decline in species richness in urban areas, while agricultural practices also leave their mark on lichen diversity, favoring nitrogen-tolerant species over others.

P180 – BIODIVERSITY ASSESSMENT OF VERTEBRATES IN RUNNELS COUNTY, TEXAS

AUTHORS: Maya Morrell[1], Makayla Easley[1] (1. Hardin Simmons University)

ABSTRACT

This study seeks to assess the biodiversity of vertebrates, with the exclusion of amphibians, in Runnels County, Texas, with the primary goal of establishing a comprehensive catalog of the region's species. As of now, there is a lack of documented information regarding the native wildlife in Runnels County, which can pose challenges regarding conservation management. This study employs a multi-faceted approach that combines intensive field surveys, camera trap monitoring, and community collaboration collection efforts to assess biodiversity. This comprehensive methodology enables an in-depth exploration of the species composition, distribution patterns, and ecological dynamics throughout Runnels County. Preliminary results reveal a rich diversity of vertebrates, including small mammals, large mammals, avians, and reptiles. These findings serve to emphasize the ecological significance of Runnels County. Such diversity is not just a matter of species variety; it indicates strong ecological interactions and environmental resilience. Moreover, this study aims to provide valuable insights into the intricate relationships between organismal diversity and several key environmental factors. These include habitat type, land use practices, and seasonal climate variations, all of which can influence species distribution and abundance. Furthermore, the comprehensive examination of biodiversity will provide essential information that is crucial for the progress of conservation strategies and sustainable management plans for Runnels County. This is particularly important in the face of rapid environmental changes and increasing human encroachment on natural habitats. The findings could serve as a baseline for future studies and provide a framework for

ongoing monitoring of biodiversity.

P182 – DEVELOPING AN IN VIVO SCREENING PROTOCOL FOR PROTEINS PREDICTED TO PHASE-SEPARATE

AUTHORS: Kaylie Cano[1], Sebastián Vélez Guzmán2, Steven T. Whitten2, Loren E. Hough3, Karen A. Lewis2 (1. Temple College, 2. Texas State University, 3. University of Colorado Boulder)

ABSTRACT

Like oil and water, liquid-liquid phase separation (LLPS) is an established polymer phenomenon that spontaneously separates a heterogeneous component mixture. In recent years, many biomolecules, including proteins and RNA, have been identified as exhibiting LLPS to affect biological signaling and regulation. We are particularly interested in how intrinsically disordered proteins (IDPs) may phase-separate. IDPs are highly flexible and interchangeable conformations that function under physiological conditions. Understanding the potential phase separation behavior of IDPs can help us understand the fundamental aspects of diseases such as Ewing Sarcoma, dementia, and Alzheimer's. The Whitten group built the ParSe computer program, which predicts LLPS behavior using only protein sequences. Analysis of the yeast proteome by ParSe identified hundreds of yeast IDPs that may undergo LLPS. Here, we show the development of a protocol to test these predictions. Therefore, we chose nine gene targets to test if LLPS takes place in vivo by screening GFP-tagged IDP sequences. These proteins were selected based on their known roles in yeast cell signaling and regulation of gene expression. From this set of nine, we piloted the gap-repair cloning process with LGE1 and WSC2 before proceeding with the remaining targets. A significant result of this project is the growth of yeast colonies, which means a transformation and gap repair was successfully accomplished. We anticipate this project will establish the molecular biology workflow for higher-throughput screening of ParSe-predicted proteins using recombinant-tagged protein expression in yeast and fluorescence microscopy.

P183 – DEVELOPMENT AND VALIDATION OF AN ANALYTICAL METHOD FOR THE DETERMINATION OF MINOR AND TRACE METALS IN WATER BY ICP-OES

AUTHORS: Layla Jackson[1], Alakananda Chaudhuri[1] (1. University of the Incarnate Word)

ABSTRACT

The aim of this study was to validate the proposed method for the simultaneous determination of some minor and trace elements (Li, Na, K, Sr, Ti, Mo, and Se) in drinking water and surface water by inductively coupled plasma optical emission spectroscopy (ICP-OES). The analytical signals of both axial and radial views were measured and compared for matrix interference and sensitivity. Single and multi-element calibration standards were prepared from ICP-grade standard stock solutions of these elements in 2.5% (v/v) HNO3 and used to calibrate the instrument response with respect to analyte concentration. The validation of the method was performed by evaluating different instrumental and measurement parameters such as analytical wavelengths, plasma parameters, data acquisition parameters, accuracy, precision, sensitivity, linearity, limit of detection (LOD), method detection limit (MDL), linear dynamic range (LDR), and spike recovery. Inter-element interferences were minimized by selecting alternate wavelengths and by adjusting the concentrations of the interfering elements in the calibration and sample solutions. The correlation coefficient values ($r > 0.995$) obtained showed good linearity. The accuracy and precision of the method was tested by using Certified Reference Materials (Trace Metals in Drinking Water, CRM-TMDW). The recovery of the elements was found to be within the accepted range of 85-115%. The results show that the method is selective and can be successfully applied for the simultaneous determination of these elements with the regulatory acceptance limits determined by the Environmental Protection Agency (EPA) and the Texas Commission on Environmental Quality.

P185 – ASSESSING THE EFFECTS OF EARLY LIFE MATERNAL SEPARATION STRESS ON ADOLESCENT BEHAVIOR AND HYPOTHALAMIC-PITUITARY-ADRENAL AXIS FUNCTION IN MALE AND FEMALE C57BL/6J MICE

AUTHORS: Grace Read[1], Caroline Fowler[1], Elisabeth Vichaya[1] (1. Baylor University)

ABSTRACT

Early life stress (ELS) is linked to an increased risk of neuropsychiatric disorders such as major depressive disorder, generalized anxiety disorder, and substance use disorder. Exposure to ELS can disrupt neural, immune, and endocrine system development,

and some forms of ELS have shown dysfunction of the hypothalamic-pituitary-adrenal (HPA) axis and a compromised stress response. In pre-clinical studies using mice, maternal separation (MS) is commonly used to model ELS because of its impact on corticosterone levels, a marker of stress dysregulation. This study aimed to validate the MS protocol in our lab and assess the effect of MS on adolescent mice, focusing on behavior, as well as endocrine, neural, and immune functions. This study investigated both male and female mice, as females are often underrepresented. Using a 2 (+/- MS) x 2 (male/female) factorial design with 6-10 mice/group, MS was performed from postnatal day 1 to 14 for 3 hours/day and behavior was tested from postnatal week 4 to 6. No behavioral differences were observed at 4 weeks, but by 6 weeks a significant MS-by-sex interaction emerged for anxiety-like behavior on the elevated-plus maze. MS mice of both sexes also exhibited less anxiety-like behavior following acute stress exposure, suggesting a possible blunted stress response. Furthermore, MS mice of both sexes showed a reduced relative thymus size and an enlarged relative spleen size. To further understand the link between ELS and neuropsychiatric risk, we are analyzing plasma corticosterone levels and gene expression changes related to neuroinflammatory processes.

P186 – DESMOINESIAN (MIDDLE PENNSYLVANIAN) FUSULINIDS FROM HOLMAN HILL, MORA COUNTY, NEW MEXICO

AUTHORS: Ariana Rodriguez[1], Michael Read[1] (1. Stephen F. Austin State University)

ABSTRACT

Two collections of Middle Pennsylvanian fusulinids (late Paleozoic larger benthic foraminifera) were assessed from two limestone beds of an outcrop near the top of the Holman Hill composite section, Mora County, New Mexico. The limestone unit has been regarded as part of the "Porvenir Formation" in previous studies; however, further research must be done on this lithostratigraphic unit to corroborate its name. The Porvenir Formation and the Holman Hill section are both Desmoinesian (Middle Pennsylvanian) in age based on correlative conodont assemblages, indicating the two units are coeval (in part). The present study was concerned with the lack of biostratigraphic data on fusulinid assemblages and biozones in the area. The lithologic samples collected were cut, oriented, and thin sectioned to be able to measure the fusulinids. Morphometric data were then collected from the specimens found between the two intervals using ImageJ software. The data collected were length, width, form ratio (L:W), diameter of the proloculus, thickness of spirotheca, height of volutions, and tunnel angles. The data were then compared to previously described taxa in North American fusulinid literature and the Ellis and Messina Catalogue of Foraminifera. Of the two assemblages, two fusulinid species were identified: Beedeina erugata and Beedeina sp. A. Beedeina erugata was found in the lower bed of the studied interval and Beedeina sp. A was found in the uppermost bed. Beedeina sp. A is discussed in open nomenclature because this form does not resemble any other late-middle Desmoinesian fusulinids that have been previously described.

P187 – DETECTION OF NON-NATIVE FRESHWATER JELLYFISH CRASPEDACUSTA SOWERBII IN CENTRAL TEXAS USING ENVIRONMENTAL DNA

AUTHORS: Vera Ye[1], Morgan Jennison[1], Kaitlin Plate[1], Matthew A. Barnes[1] (1. Texas Tech University)

ABSTRACT

Non-native, invasive species represent one of the greatest threats to global biodiversity. For example, the freshwater jellyfish Craspedacusta sowerbii is native to the Yangtze River valley in China but has established populations in Texas. Its presence can disrupt food web dynamics by altering zooplankton levels and lowering oxygen levels available in the environment. In Texas, this species was first detected at Medina Lake near San Antonio and has since spread to other reservoirs near Houston and Dallas. The jellyfish is mainly spread through connected river systems and high human activity, such as recreational boating. However, there is limited detailed knowledge of the spread and establishment of this jellyfish, and their distribution is still understudied. Therefore, we conducted an environmental DNA (eDNA) survey to assess the spatial distribution of C. sowerbii in Bridgeport, Granbury, Lewisville, Possum Kingdom, and Richland Chambers lakes in central Texas. Specifically, we collected surface water at publicly accessible boat ramps and conducted on-site filtered before returning to the lab for quantification of jellyfish eDNA via digital PCR. Additionally, we took advantage of the fact that our research group had previously collected samples at these sites (years = 2014, 2020) to examine invasion chronology through time. Occurrence data from our study will support state and local agencies in developing more effective management strategies to protect Texas freshwater ecosystems from invasive species pressures and enhance conservation efforts by identifying invasion hotspots.

P188 – MICROFRAGMENTATION METHOD ALTERS GROWTH IN THE ENDANGERED STONY CORAL ACROPORA PALMATA

AUTHORS: Deanna Soper[1], Maria Cordero[1], Nora Aigberadion[1], Monique Bedolla[1], Jason Spadaro[2], Ian Combs[2], Keiyi Okamura[2], Makayla Stewart[2], Sarah Hamlyn[3], Lou Schecker[2] (1. University of Dallas, 2. Mote Laboratories, 3. Big Pond)

ABSTRACT

Coral reefs around the world have experienced substantial loss in recent years due to a myriad of stressors including global climate change, pollution, and disease. In an effort to preserve this important ecosystem, many active restoration techniques have been developed. One such technique is microfragmentation, which involves taking larger pieces of coral and cutting them down to approximately 1cm2 size. This initiates rapid growth in stony corals, which are notorious for consistently slow growth rates and allows for the production of large amounts of coral tissue for the restoration of degraded reefs using relatively little source material. Recent work has revealed that after microfragmentation, edge portions grow faster and have increased production of growth factors. Here we hypothesized that a microfragmentation technique that separates edge tissue from center tissue would initiate a faster growth rate than when the center and edge tissue are both present on the same resulting fragment. We used the species Acropora palmata, an endangered branching-form coral on Florida's Coral Reef, and implemented two different microfragmentation techniques that resulted in either edge and center tissue being present (pie treatment) or separating edge from center tissue (punch-out treatment). We found that the punch-out treatment resulted in increased growth and that edge fragments had the fastest growth rate. These results suggest that altering the microfragmentation technique may lead to more rapid production of coral tissue that can be used for restoration purposes.

P189 – PRELIMINARY DATA ON THE INFLUENCE OF HABITAT TYPE AND ENVIRONMENTAL VARIABLES ON FISH COMMUNITY DYNAMICS IN HARMON CREEK, TEXAS

AUTHORS: Erica Hagmeyer[1], Jeffrey R. Wozniak[1] (1. Sam Houston State University)

ABSTRACT

Habitat heterogeneity and environmental factors can be key drivers of fish diversity in pristine headwater stream systems. Monitoring how these parameters change through time and space can provide insight into the driver(s) of fish community dynamics. This research project, set in Harmon Creek, a second order stream in the Trinity River Basin, is exploring how fish assemblages vary amongst the streams various habitat types and how key environmental drivers influence the fish community composition. Previous assessments (2006-2015) of the fish community indicated that Blacktail shiner and Western mosquitofish were the most dominant species with the total community diversity including 16 species. We are currently 11 months into a 12-month sampling schedule that involves monthly fish surveys at five locations along Harmon Creek at the Pineywoods Environmental Research Laboratory. We hypothesized that habitat type will have a strong influence on fish diversity and that fish diversity will be highest in habitats possessing moderate temperature, low turbidity, and high dissolved oxygen. Data analysis to date indicates that Blacktail shiner is still the dominate species in the system, while overall species diversity has decreased to 14 species. Rarely occurring species from the historical data (Warmouth and Longear sunfish) appear to no longer occur in the system. Monthly data collection events will continue through March '25. Our goal is that this study will assist PERL habitat managers to better understand how the stream system, and more specifically the fish that inhabit it, respond to fluctuations in key environmental variables through time.

P191 – COEFFICIENT OF RESTITUTION OF TWO COLLIDING PARTICLES IN EXPERIMENT AND SIMULATION

AUTHORS: Jeffrey Olafsen[1], Kai Yang[2] (1. Baylor University, 2. Shanghai University)

ABSTRACT

We present a study of the coefficient of restitution of two particles free to collide in a vertically shaken channel both experimentally and via simulation. Multiple cases have been investigated with the driving frequencies, f, ranging from 23 to 32 Hz and the acceleration magnitudes, ?, from 1.78 to 3.53 g. Both the experiment and simulation results suggest the coefficient of restitution is not simply a material constant, but rather depends strongly on the impact velocity. The dependence of the coefficient of restitution on the driving frequency and amplitude are also examined. The aim of the study is to understand the

mechanism of super-elastic collisions, where the coefficient of restitution is measured to be greater than unity and suggests a gaining of translational kinetic energy after collision.

P192 – INDOLE VARIANT-SPECIFIC EFFECTS ON FUSOBACTERIUM NUCLEATUM INVASION AND BARRIER FUNCTION IN INTESTINAL EPITHELIAL CELLS

AUTHORS: Jessalyn Hawkins[1], Colin Scano[1], Gregory Zaharas[1], Leigh Greathouse[1] (1. Baylor University)

ABSTRACT

Colorectal cancer (CRC) stands second in cancer related deaths in the United States. Overabundant in CRC, Fusobacterium nucleatum (F. nucleatum) promotes cell proliferation, invasion of cancer cells, and is a strong producer of the biofilm quorum signal, indole. Indole has multiple variants, though their individual effects are not well-defined. Interestingly, indole-3-carboxylic acid (I3CA) inhibits invasion of F. nucleatum into host cells after two hours ($p<0.05$), while after 4 hours, indole, indole-3-aldehyde (I3A), and I3CA inhibit invasion ($p<0.01$, $p<0.001$, $p<0.001$). As indole variants do not have clear signaling patterns in CRC, unlike normal epithelial cells, it is expected that they will produce varying effects on barrier functioning in host cells. We hypothesized that indole variants increase expression of tight and adherens junctions in CRC epithelial cells to increase barrier functioning and inhibit bacterial invasion. RT-qPCR analysis revealed that I3A treatment increased occludin expression at 6 hours ($p<0.005$, fold change = 1.75), though this effect did not persist at 24 hours, and significantly altered claudin-2 levels, decreasing at 6 hours ($p<0.002$, fold change = 0.149) and increasing at 24 hours ($p<0.001$, fold change = 3.175), potentially enhancing barrier permeability. Additionally, claudin-7 expression was modestly elevated at 24 hours ($p<0.05$, fold change = 1.31), which, along with occludin, may support improved barrier integrity. These findings suggest that indole influences the intestinal epithelial barrier and that indole variants differentially affect gene expression in colonic epithelial cells, underscoring the need to further study each variant's unique impact in the context of colon carcinogenesis and treatment.

P194 – COMPARATIVE ANALYSIS OF VARROA MITE INFESTATION IN MANAGED BEE POPULATIONS IN WILLIAMSON COUNTY, TEXAS

AUTHORS: Ramiro Collado Irizarry[1], Chad Cryer[1] (1. Temple College)

ABSTRACT

The decline in bee populations poses significant risks to ecosystem health and agricultural productivity, with domesticated honeybee colonies particularly vulnerable to infestation by Varroa mites (Varroa destructor). These parasites weaken bee colonies by suppressing immune systems, decreasing reproductive rates, and increasing susceptibility to viral pathogens like the deformed wing virus. Varroa live on the larval stage affecting the health of the future nursing bees, starting a decline in the generations of the nursing bees and overall colony health. While the impact of Varroa mites on domesticated colonies has been widely studied, mite prevalence and adaptations for natural resistances in domesticated bees remain less documented and understood. We are presenting varroa mite count data from domesticated bee colonies in Williamson County, Texas, suggesting that these colonies depend on human interaction to combat mite threats and may lack the natural defenses to resist infestations on their own. Highlighting the challenges domesticated colonies have when dealing with mite infestation without human intervention. These findings suggest that domesticated bees have most likely adapted with human interaction, leading to the loss of certain resistances and protective traits for the survival of the colonies. By understanding domesticated bee vulnerabilities, this research contributes to broader efforts in improving colony resilience, which is essential for both bee health and ecological balance.

P195 – YOU BETTER BELIZE THEY'RE DIFFERENT: PHYLOGENETIC ANALYSIS AND SPECIES IDENTIFICATION OF NATIVE APPLE SNAILS IN BELIZE

AUTHORS: Gage Mallo[1], Johun Reyes[1], Romi Burks[1] (1. Southwestern University)

ABSTRACT

Species delineations of gastropods traditionally rely on shell morphology. However, modern definitions of species require phylogenetic analysis. Apple snails (genus Pomacea) hold incredible promise in helping us understand mechanisms underlying climate-driven range expansions, with two notable invasive species (P. canaliculata and P. maculata) having recently expanded their global range. However, we know relatively little about the ranges of other native apple snails, especially those in

understudied regions such as Central and South America. Due to extensive phenotypic plasticity, researchers often encounter difficulty in identifying mollusks when only relying on shell morphology. Identifying apple snails creates additional challenges as some may hybridize and others constitute what experts term cryptic species. Despite their ecological importance in wetlands, only one study to date provides a species identity (Pomacea flagellata) for native apple snails in Belize. To confirm or compare this identity with genetic data, we collected apple snails (either as hatchlings or adults from which we dissected foot tissue), extracted DNA and began barcoding (using COI) individuals. Our four sites [Sibun River, Crooked Tree Wildlife Sanctuary, Spanish Creek, and Ayin Ha (Lemonal)] collectively represent at least two different watersheds depending on the hydrologic connectivity during the wet season. Preliminary results from Ayin Ha and the Sibun River do not match known sequences for P. flagellata or any other verified genetic identity. Future investigations will involve more robust phylogenetic analysis that we predict will support our belief in the need for additional studies that better quantify apple snail species diversity and distribution in Belize.

P196 – CHARACTERIZATION OF BRCA1/2 VARIANTS IN LATINAS USING GENOMIC PREDICTION TOOLS: A STUDY FROM NIH ALL OF US RESEARCH PROGRAM

AUTHORS: Eunice Pelcastre Villanueva[1], Catherine Gavile[2], Erick Olivares[3], Cathy Samayoa[4], Adriana Visbal[5] (1. University of Houston-Downtown, 2. University of Utah, 3. University of Texas San Antonio, 4. San Francisco State University, 5. University of Houston)

ABSTRACT

Breast cancer disproportionately affects Latina women in the United States, yet genetic risk factors in this population remain under characterized. Mutations in the BRCA1 (BReast CAncer gene 1) and BRCA2 (BReast CAncer gene 2) genes are known to confer a high hereditary risk for breast and ovarian cancers, with pathogenic variants increasing lifetime breast cancer risk by up to 75%. However, limited representation of Latinas in genetic studies has led to a significant knowledge gap regarding BRCA1/2 variants in this population. The NIH All of Us Research Program aims to address this gap by developing a diverse genetic database to support research on health disparities, including genetic risk factors for breast cancer in Latinas. This study utilizes the All of Us genomic database to identify novel BRCA1/2 variants among Latinas and predict their pathogenicity through in-silico tools, including PolyPhen-2, SIFT, and MutationTaster, following American College of Medical Genetics (ACMG) classification guidelines. Here we report on the ongoing analysis of BRCA1/2 variants, focusing on those unique to individuals of Latin descent. Preliminary findings suggest the presence of potentially pathogenic variants not previously recorded in existing genetic databases. Our research aims to provide insights into the prevalence and clinical relevance of BRCA1/2 mutations in Latinas, thus supporting precision medicine efforts that address racial disparities in genetic counseling and testing. The broader implications of this work include improved screening recommendations and healthcare strategies for Latinas at elevated breast cancer risk, contributing to health equity in cancer prevention and management.

P204 – MAKING DECISIONS: DOES MITOCHONDRIAL METABOLISM INFLUENCE RETINOGENESIS?

AUTHORS: Yaqueline Gutierrez[1], Yessenia Beltran[1], Emilia Santamaria[1], Elda Rueda[1] (1. University of Houston-Downtown)

ABSTRACT

The retina is the light-capturing tissue of the eye that allows us to see. Neurons and glial cells make up the adult-retina. During development, a pool of stem-like cells called the retinal progenitor cells (RPCs) give rise to neurons and glial cells. RPCs must make decisions to continue proliferating or exit the cell-cycle to enter retinogenesis. By the end of development about half of neurons in the inner retina need to die for the necessary neural connections to form. Thus, cell division, neurogenesis, and cell-death are spatiotemporally coordinated and tightly regulated to produce a specific ratio of the different cell types within the adult-retina. The molecular mechanisms that regulate such cell decisions are not completely understood. Metabolism is an essential factor for development. This is evident by congenital retinal disorders caused by mutations in metabolic enzymes. Metabolism is the set of cellular processes that convert nutrients into cellular energy. Most enzyme-mediated metabolism occurs in mitochondria. To investigate how metabolism interfaces with retinogenesis we disrupted the expression of the mitochondrial transcription factor A (TFAM) in the RPCs of mice. In the current study we are characterizing the consequences of Tfam loss in the developing retina.

P206 – MINIMALLY INVASIVE MEASUREMENT OF ZONULIN, A KEY BIOMARKER FOR ENVIRONMENTAL

ENTERIC DYSFUNCTION AND CHILDHOOD GROWTH FALTERING, IN DRIED BLOOD SPOT SAMPLES

AUTHORS: Luna Orozco[1], Elizabeth Kim[1], Emma Shoemaker[1], Laila Fahed[1], Tomasz Nowak[1], Samuel Urlacher[1], Michael Muehlenbein[1] (1. Baylor University)

ABSTRACT

Pathogen exposure from unsanitary living conditions can damage the gut, leading to decreased barrier integrity and poor nutrient absorption. This subclinical condition – termed environmental enteric dysfunction (EED) is the reality for millions of children globally and is now recognized as the world's leading cause of childhood growth faltering. Problematically, current assessment of EED requires invasive procedures, such as venipuncture blood sampling, that are burdensome for many groups, especially children living in low-to-middle-income countries where EED is common. Here, we validate the measurement of zonulin, a biomarker of EED and gut permeability, in minimally invasive finger-prick dried blood spot (DBS) samples using a commercially available ELISA kit (Elabscience, E-EL-H5560). Following initial assay optimization, zonulin was measured in the 'Waco100' matched DBS and serum sample set. Zonulin was reliably detected in all DBS samples (mean = 4.963±4.383 ng/mL) and exhibited a strong linear relationship between DBS and serum values (r>2> = 0.96; Passing-Bablok regression). Additional validation testing of spike and recovery (101.5±12.7% recovery), dilutional linearity (96.4±15.5% recovery), and freeze-thaw/hot-cold analyte stability (all effects $p > 0.05$) indicated strong assay performance. In an initial application of this method, we measured zonulin in samples collected from Shuar children of Amazonian Ecuador (n = 131, ages 4-12 years), a population of forager horticulturalists who are experiencing market integration. These children had zonulin concentrations indicative of EED (mean = 0.66±0.47 ng/mL). The measurement of zonulin in DBS samples will aid in a better understanding of the global impact of EED on childhood growth outcomes.

P207 – SIMULATING THE MINIMUM NUMBER OF PEOPLE NEEDED FOR AN INTERSTELLAR JOURNEY

AUTHORS: Dominic Mashak[1], Steven Alexander[1] (1. Southwestern University)

ABSTRACT

When discussing the difficulties of interstellar travel, one of the many questions that has to be addressed concerns the minimum number of people that would permit a healthy multi-generational crew to complete a journey lasting hundreds of years. In 2017, Drs. Frederic Marin and Camille Beluffi published a study in the Journal of the British Interplanetary Society that considered a number of factors (such as the number of women vs. men, their respective ages, life expectancy, fertility rates, birth rates, and how long the crew would have to reproduce). Drs. Marin and Beluffi created a computer program that simulated the lives of each crew member in order to determine whether the mission could be successful. They then averaged the results of these simulations over 100 interstellar journeys based on these various factors and different values to determine the size of the minimum crew. In the end, Drs. Marin and Beluffi concluded that under conservative conditions, a minimum of 98 crew members would be needed to sustain a multi-generational voyage to Proxima Centauri. We have reproduced Marin and Beluffi's program and found that the maximum possible crew size plays an important role in the success of the mission. In this poster we reevaluate the conclusions of Marin and Beluffii in light of this discovery.

P209 – USING MOLECULES TO STORE ENERGY

AUTHORS: Dante Medina[1], Steven Alexander[1] (1. Southwestern University)

ABSTRACT

The sun is a source of abundant renewable energy but to be viable, solar energy collectors require storage devices that can supply energy on demand when sunlight is unavailable. At the moment, most storage devices rely on chemical batteries but an intriguing alternative is to directly capture and store solar energy using organic molecules. This concept was first proposed in 1909 by Luther Weigert. After extensively reviewing the Woodward-Hoffmann rules, Weigert suggested anthracene dimerization as an energy storage mechanism. Since then, several other molecules have been studied as potential energy storage systems. Collectively these systems are referred to as molecular solar thermal (MOST) systems or solar thermal fuels. In this poster we examine the properties of several molecules that have been identified as promising candidates using semiempirical and density functional methods.

P210 – EVIDENCE OF AGING RECOVERY ON GERMINATION RATE OF ADMIXED GENOTYPES OF ARABIDOPSIS THALIANA

AUTHORS: Syeda MTI Sanzara[1], Kattia Palacio-Lopez[1] (1. University of Houston-Downtown)

ABSTRACT

Arabidopsis thaliana, referred to hereafter as Arabidopsis, is an annual autogamous plant capable of producing thousands of seeds in each generation. Intraspecific hybridization, or admixture, involves mixing distinct genomes from different regions within a species' range. In Arabidopsis, admixed genotypes were created through flower emasculations. The long-term viability of Arabidopsis seeds, as well as how hybridization may affect seed longevity, remains uncertain. This study investigates the germination rates of Arabidopsis seeds (both hybrids and their parents) over three generations. Initially, we assessed the germination rate of F3 seeds that had been dormant for eight years. After germination, these seedlings were grown to establish the next generation. We then measured the germination rates of the subsequent F4 and F5 generations. All generations (F3, F4, and F5) underwent vernalization for 7 to 14 days before being planted on Petri dishes with filter paper. The experiment included 14 parental genotypes and 11 hybrid genotypes, each with three replicas and approximately 50 seeds per plate. Germination percentage was calculated as the number of seeds germinated out of the total seeds planted over a 7-day period. F3 seeds germinated after nine days with a germination rate of 1% for parents and 5% for hybrids, while F4 and F5 seeds germinated within six days, achieving around 65% germination for parents and 86% for hybrids. Understanding the mechanisms of extended dormancy and successful germination offers valuable insights into plant biology, crop management, and conservation.

P212 – HOW DOES EXPOSURE TO DROUGHT AND HIGH-TEMPERATURE CONDITIONS AFFECT THE DEVELOPMENT OF ARABIDOPSIS THALIANA?

AUTHORS: Laura D'luyz Pastor[1], Syeda Sanzara[1], Yoselin Sanchez[1], Kattia Palacio-Lopez[1] (1. University of Houston-Downtown)

ABSTRACT

This study examines the effects of environmental stresses, specifically drought and high temperatures, on the life cycle of different populations of Arabidopsis thaliana (Arabidopsis), a widely used model organism in plant biology recognized for its adaptability to varied environmental conditions. Given recent environmental degradation and its risks to crop yields, understanding stress responses in Arabidopsis provides valuable insights into developing strategies for enhancing crop resilience to climate change. This research aimed to identify plasticity traits that support drought and temperature tolerance in Arabidopsis. Three experimental conditions were established (control, drought, and high-temperature) using eight genotypes with twelve replicates each. Plants in drought conditions experienced a 14-day dry period, compared with control plants that were watered once weekly. For temperature treatments, control plants were grown in a chamber at 18°C under a 16-hour light/8-hour dark cycle and watered weekly, while high-temperature plants were kept in a separate chamber at 28°C with the same light cycle and watered twice weekly. Plants in stressful conditions spent approximately 21 days in the vegetative stage, focusing on resource allocation toward silique development and reproduction. Plasticity was evaluated by measuring phenotypic traits, including rosette size, leaf number, bolting time, height, fruit production, and seed weight. Results showed a significant reduction in rosette size, leaf number, height, fruit count, and seed weight, along with a faster lifecycle completion under limiting conditions (drought and high-temperature). These phenotypic responses demonstrate the species' ability to withstand environmental stresses, underscoring its adaptability to high-temperature conditions and highlighting potential traits for selection.

P213 – ARABIDOPSIS THALIANA FITNESS AND RESOURCE ALLOCATION WHILE IN AN INTERSPECIFIC COMPETITION WITH LOLIUM MULTIFLORUM.

AUTHORS: Daniel Medina[1], Kassandra Orellana[1], Kattia Palacio-Lopez[1] (1. University of Houston-Downtown)

ABSTRACT

Arabidopsis thaliana, native to Eurasia and Africa, requires few minerals, light and water for its fitness (plants ability to survive and reproduce). When these resources are limited by interspecific competition, fitness and biomass are negatively impacted and plants tend to adapt their resource allocation towards survival. Arabidopsis thaliana has a rapid life cycle, making it an ideal model for studying plant adaptation in response to interspecific competition. In this study, we show how Arabidopsis thaliana prioritizes

fitness, by allocating available resources towards survival and reproduction. We submitted 13 genotypes of Arabidopsis to an interspecific competition with Lolium multiflorum, a plant with rapid growth, high biomass, and adaptability. Each Arabidopsis genotype was isolated and placed in the center of individual pots with four L. multiflorum divided into the corners of the pot. For our control, we placed the same isolated genotypes of A. thaliana in individual pots, and both experimental conditions were watered once per week. Allowing us to compare fitness by observing the size and number of leaves in the rosette and the time of bolting. In our study we found that the A. thaliana subjected to competition had smaller rosettes with fewer leaves and a faster bolting rate when compared to the control environment. Our results show that Arabidopsis thaliana can adjust its biomass and fitness when in an intraspecific competition. These fitness adaptations give us insights into potential paths for the evolution and survival of species and can let us further explore adaptations during climate change.

P214 – PHOTONEGATIVE BEHAVIORS OF POLYCHAETE WORMS

AUTHORS: Ian Gafford[1] (1. Cinco Ranch High School)

ABSTRACT

The class Polychaeta, from the phylum Annelida, covers a wide range of 12,000 species with a variety of morphological traits that are dictated by its habitat. In many cases, the lifestyle of the polychaete worms is heavily influenced by their photosensitivity, which has evolved to help the worms avoid predation during daytime hours. Their photonegative behaviors include swimming away and burrowing in sand. Polychaete worms vary in their eye structure, ranging from two ocelli on the worm's prostomium, to having complex eyes with lenses, each suited for their unique environment and lifestyle. The aim of this project was to determine the effect of different eye structures of the polychaete worms on their photonegative behaviors, using two families, Glyceridae and Nereididae, found in the Salish sea. The ocelli of the worms in Glyceridae are typically fairly primitive due to their burrowing lifestyle where they are unlikely to encounter light. Conversely, the compound ocelli in worms from Nereididae tend to be much more complex as a result of swimming in open water and being more prone to predation. Our preliminary results showed that both families of polychaete worms displayed burrowing behaviors upon exposure to light, however, with some different characteristics. This project was part of the summer research program for high school students at the Friday Harbor Laboratory on San Juan island, Washington.

P217 – SHOOT FOR THE MOON AN IN-DEPTH DISCUSSION OF CHILD ENGAGEMENT IN STEM

AUTHORS: RosAaliyah Olguin[1] (1. The University of Texas Permian Basin)

ABSTRACT

The increasing push to engage secondary students in STEM education is crucial, not only for growing interest in these fields but also for providing opportunities for students who may lack access to STEM related resources outside of the classroom. Many students especially those in underfunded or rural areas, face growing barriers to obtaining quality education. The NWAY curriculum produced by the WEX Foundation and NASA seeks to mend the increasing gap by engaging students with the unique opportunity to explore STEM curriculum regardless of factors such as location or background. The curriculum is aimed to provide not only secondary students with the opportunity to engage with STEM but also providing university-level students to engage with the younger generation. This unique opportunity allows both young learners and leaders to explore new ways of engaging with the curriculum while also providing opportunities to discuss fields that are related to STEM. Students who have engaged with the curriculum show an increased interest in exploring new ideas related to scientific research while providing their own experiences with the curriculum they have received. Students also provide helpful feedback to increase retention rates of the program and the eagerness of wanting to return to the program. The impact of NWAY on both secondary and university level students provided a starting point for increasing engagement of STEM in the newer generations while also impacting the use of new leaders to provide the necessary education to those who may have limited resources.

P218 – ASSESSING THERMAL TOLERANCE IN GUINEA AND JOHNSON GRASSES USING CHLOROPHYLL FLUORESCENCE AS AN INDICATOR OF PLANT DAMAGE

AUTHORS: Arvin Allahyari[1] (1. University of Houston Downtown)

ABSTRACT
The increasing frequency of heat waves due to climate change threatens plant growth and productivity. Thermal stress causes the efficiency of photosynthesis to decline due to the denaturation of proteins associated with photosystem II (PSII). This heat-induced damage increases chlorophyll fluorescence as excess light energy is re-emitted rather than used for photosynthesis. We measured chlorophyll fluorescence to quantify thermal stress damage to the photosynthetic apparatus in two invasive grasses. We compared the thermal tolerance of the grasses by exposing blade samples to a range of temperatures (20 – 60° C) in water baths and measuring their chlorophyll fluorescence with a fluorometer to quantify PSII photosynthetic efficiency (Fv/Fm). One invasive grass (Megathyrsus maximus) had greater thermal tolerance than the other (Sorghum halepense), as shown by the more gradual decline in PSII photosynthetic efficiency at higher temperatures. This result underscores physiological differences between the two species and suggests that Megathyrsus maximus may have adaptations enhancing its resilience to extreme temperatures. Although the native ranges of both species include areas of high daily temperature, their difference in thermal tolerance did not support our initial hypothesis that both invasive species would respond similarly to thermal stress. This highlights the importance of understanding species-specific responses to thermal stress. In the future, we will measure the thermal tolerance of additional grasses, both invasive and native species, and relate these tolerances to other functional traits, such as stomatal density and specific leaf area.

P220 – A COUMARIN-ENAMINE DERIVATIZED CHEMOSENSOR FOR RELAY RECOGNITION

AUTHORS: Marlene Zepeta-Rodriguez[1] (1. Stephen F. Austin State University)

ABSTRACT
A urea-bis(7-DEA-coumarin-enamine) molecular probe has been synthesized to show relay recognition of anion and cation via optical spectroscopy. Incorporating enamine-moiety to hydroxycoumarin allows it to form a two-new six-membered ring system through Resonance-assisted-hydrogen-bonding (RAHB) that extends conjugation hence fluorescence intensity. Photophysical properties have been studied in different solvent systems. In DMSO, the solution produced a pale greenish color with two broad absorption bands at 388nm and 475nm and emission at 550nm. Upon adding various anions, only CH3COO-, F-, CN-, and PO43- anions perturbed the new ring system (RAHB) and generated optical response both in UV-vis and fluorescence. Cyanide ions produced distinct absorption and emission bands due to Michael-addition to enamine moiety whereas CH3COO-, F-, PO43- abstract proton from RAHB and form a tetradentate ligand cage. Acetate ion was chosen for the deprotonation of RAHB and generating tetradentate ligand. Upon the addition of various metals, only Cu2+ and Ni2+ ions show optical response, absorption spectra shift bathochromically from 361nm to 370nm, and emission spectra at 451nm quenched which means fluorescence turned 'OFF' via chelation quenched fluorescence (CHQF) mechanism. Furthermore, based on Hard-soft acid-base (HSAB) theory Cu2+ and Ni2+ ions are hard acids and the tetradentate ligand is a combination of hard bases, thus due to hard-hard interaction they form a strong coordination bond.

P222 – FLUORESCENCE MICROSCOPY ANALYSIS OF MICROPLASTIC INTERACTIONS WITH MICROORGANISMS

AUTHORS: Nolan Godfrey[1] (1. Howard Payne University)

ABSTRACT
Microplastics are defined as pieces of plastic that are less than 5 millimeters in size. Larger plastic products eventually degrade into microplastics through exposure to mechanical forces, oxidation, and ultraviolet radiation. This experiment utilizes the fluorescent capabilities of compounds isolated from the root vegetables turmeric and turnip to create dyes that detect microplastics within samples using fluorescence microscopy. The fluorescent molecule isolated from turmeric is known as curcumin. The properties and molecular composition of the fluorescent molecule isolated from turnip is currently unknown. These compounds are projected to have the ability to adhere onto microplastic exterior surfaces and provide an economical alternative to the commonly used fluorescent lipophilic dye Nile Red. In hopes of furthering the available knowledge on the topic of microplastics and their effects on living cells this experiment consists of the observance of microplastics interactions with gram negative bacteria (Escherichia coli), gram positive bacteria (Staphylococcus epidermidis), and yeast (Saccharomyces cerevisiae). Liquid cultures of each type of single-celled organism are grown in the presence of dyed, evenly dispersed microplastics and then analyzed using a fluorescence microscopy technique. Results are pending. This process will allow for the identification of potential threats microplastics pose upon single cells. This experiment should offer information that will shorten the gap in knowledge that

currently exists on this topic.

P223 – A PRELIMINARY SUMMARY FOR THE THERMAL PROFILES OF MICROHABITATS WITHIN BASTROP STATE PARK: HELPING TO INFORM OCCUPANCY MODELS FOR THE HOUSTON TOAD

AUTHORS: Peter J. Babcock[1], William I. Lutterschmidt[1], Paul Crump[2], Toby J. Hibbitts[3], Wade A. Ryberg[3], Danielle K. Walkup[3], Corey Fielder[3], Brandon C. Bowers[3] (1. Sam Houston State University, 2. Texas Parks and Wildlife Department, 3. Texas A&M University)

ABSTRACT

Temperature plays a crucial role in determining habitat suitability for ectothermic animals. If daily temperature regimes expose animals to conditions outside their physiological tolerances, they must alter behaviors and/or select alternative habitats to maintain suitable body temperatures (T_b). The Houston toad (Anaxyrus houstonensis) spends a significant portion of the year burrowed beneath the soil surface to protect itself from hot, dry conditions, emerging only in late winter and remaining active through the spring breeding season. However, the influence of temperature on the ability for Houston toads to utilize different microhabitat types throughout their range remains unclear. We used ibutton® thermochron data loggers to characterize the thermal profiles of five microhabitat types found in Bastrop State Park from the height of the breeding season to the end of their activity period, when toads have returned to underground aestivation. We compared monthly above- versus below-ground temperatures within microhabitats with respect to, daily minimum and maximum air temperatures. Results of this analysis may help to further predict the potential influence of seasonal temperature change on the thermal availability and suitability of preferred habitats for the Houston toad.

P227 – OSTEOLOGICAL COMPARISON OF THE HOUSTON TOAD WITH OTHER SELECTED MEMBERS OF THE FAMILY BUFONIDAE

AUTHORS: Lauren N. Scherrer[1], Juan D. Daza[1], William I. Lutterschmidt[1] (1. Sam Houston State University)

ABSTRACT

Osteology can be used to investigate comparative difference among related species and potentially serve as an additional tool to further inform phylogenetic comparisons with relation to evolutionary and functional morphology. The Houston toad (Anaxyrus houstonensis) is a Pleistocene relict from a parental species that also originated the American toad (A. americanus). Although these species have unique distributional ranges and breading behaviors, the Houston and American toads are genetically similar which brings to question if A. houstonensis can be considered a geographical race of A. americanus. Recent genomic data has demonstrated that these species are isolated. Here we will use Computed Tomography (CT) to investigate potential morphological differences and variation in osteology among preserved specimens within the family Bufonidae, with specific comparisons between Houston and American toads. We anticipate that results from osteological comparisons will provide additional information on morphological difference among Bufonid species that may inform phylogenetic discussions.

P230 – ARACHNID SPECIES IN CALLAHAN COUNTY

AUTHORS: Jacob Wooten[1], Terrence Boyle[1] (1. McMurry University)

ABSTRACT

The goal of this research was to sample the diversity of arachnids at Firebase Libby, a 160 acres property in central Callahan County, Tx. I utilized two types of traps: pit-fall traps and flip traps. Opportunistic catches by hand were also used to sample as well. Callahan County is home to an estimated 70 different species of arachnid present. Over the course of 8 collecting days, I identified 41 species and collected 83 specimens. My collections were shortened because access to the property was lost. Future studies will expand the collecting area to roadsides throughout Callahan County and into neighboring Taylor County as well.

P232 – COMPARATIVE MEDIUM TO LARGE MAMMAL DIVERSITY WITHIN THE CROSSTIMBERS OF CENTRAL CALLAHAN COUNTY TEXAS

AUTHORS: Melinda Siebert[1], Joel Brant[1] (1. McMurry University)

ABSTRACT

This study explores the medium to large mammal species inhabiting two distinct habitat types in central Callahan County, Texas, on Firebase Libby (a 160-acre land owned by McMurry University). The habitats surveyed were the Crosstimbers Post Oak Woodland (100 acres), and the Crosstimbers Savannah Grassland (60 acres). Eight Moultrie A-9000 cameras were deployed at specific locations on Firebase Libby. Once the camera traps were established they were operated 24/7 with the batteries and SD cards changed monthly. Data was recorded from the 1st of January 2024 to the 6th of June 2024. The footage was analyzed to identify and record species in an Excel database. We calculated the diversity indices (Margalet's richness, Simpson's evenness, and Shammon's diversity) for the overall property and each habitat type. White-tailed deer and feral pigs were the most abundant on the property in both habitats while Coyotes and raccoons were the most abundant carnivores in general. Notably, the woodland area exhibited significantly more diversity than the grassy area. This research enhances our understanding of the mammalian diversity within the western edges of the Crosstimbers ecoregion in Texas.

P233 – EFFECTS OF AGE AND HEALTH OF DEER ON NASAL BOT FLY COUNTS IN WHITE-TAILED DEER

AUTHORS: Evee Rasor[1], Julia Galvan[1], Chad Cryer[1] (1. Temple College)

ABSTRACT

Botflies are of the genus Cephenemia and family Oestridae. Botflies are host dependent and live inside the nasal passageways and throat of deer, elk, and moose to host their offspring until the 3rd instar in their lifecycle, upon which time they leave through the nostrils or oral cavity. Some deer have been seen struggling to remove these larvae from their nose or throat, if this persists it can result in difficulty of breathing and in some cases deadly pathogenesis. In this study, we collected samples of bot fly larvae from deer heads dropped off for processing at Cryer taxidermy shop. We compared nasal bot fly larval loads in white-tailed deer to its estimated age, and the health based off the deer's antler score. The higher the score, the better estimated health. Our results show how the age and health of the deer affect the infestation of larvae in their nasal pathway.

P234 – MIR-23A AS A POTENTIAL POST-TRANSCRIPTIONAL REGULATOR OF KDM6A AND CTCF PROTEIN EXPRESSION IN EMT

AUTHORS: Emily York[1], Joseph Taube[1] (1. Baylor University)

ABSTRACT

Epithelial-to-mesenchymal transition (EMT) is the process epithelial cells undergo to become migratory by acquiring mesenchymal morphology. EMT plays a significant role in cancer progression, allowing tumors to become metastatic and colonize secondary tumor sites across the body. Key regulators of EMT include lysine (K)-specific demethylase 6A (KDM6A), which is an activator of epithelial gene expression, and CTCF, a chromatin looping factor, both of which are epigenetic regulators of cell plasticity. While both CTCF and KDM6A are suppressed in EMT, neither is regulated at the transcriptional level. Therefore, our aim is to investigate post-transcriptional regulation of CTCF and KDM6A. MicroRNAs are short non-coding RNA fragments that inhibit translation by binding to complementary mRNA strands. MicroRNA-23a (miR-23a) has been found to play significant roles in the initiation, progression, and treatment of cancer. Specifically, increased expression of miR-23a has been shown to be present in highly metastatic breast cancer cells. The capacity of miR-23a to bind and suppress translation or either KDM6A or CTCF has not been established. We hypothesize that miR-23a plays a role in EMT regulation via suppression of these two proteins. Various genomic data analysis programs including miRsearch, MIRANDA, and TARGETSCAN have shown that miR-23a is predicted to bind to conserved sites in both the KDM6A and CTCF transcripts and have yielded a potential pairing region of miR-23a to the mRNA sequence. Ongoing research is being conducted to determine protein expression levels in KDM6A and CTCF with experimental manipulation of miR-23a levels.

P239 – DEVELOPING A PALEONTOLOGICAL DATABASE FOR THE FOSSIL COLLECTION IN THE DEPARTMENT OF EARTH SCIENCES AND GEOLOGIC RESOURCES AT STEPHEN F. AUSTIN STATE UNIVERSITY

AUTHORS: Kandace Muniz[1], Michael Read[1], R. LaRell Nielson[1] (1. Stephen F. Austin State University)

ABSTRACT

The Stephen F. Austin State University Department of Earth Sciences and Geologic Resources fossil collection houses over one thousand fossil specimens from every major animal phylum collected by students, donors, and fossil distributors. However, after several decades without proper curation, the fossil collection was in need of organization and digitization. Within this collection, a number of specimens were presumed to be missing or were found in different locations in the department. Synonymized or otherwise obsolete taxonomic names of fossil genera and species had not been updated and there was no clear and complete inventory of specimens available to the department or outside researchers. The goal of this project was to compile and produce a catalog of the fossil specimens in the form of an online database. To accomplish this, a spreadsheet was created, listing all the fossil specimens and their accompanying information (e.g., taxonomy, geologic age, stratigraphic occurrence, collection locality). Information for each sample was carefully researched and updated as needed. Photos of the fossils were taken for reference and ease of access for students or faculty interested in studying specimens from the collection. Using the CONTENTdm digital asset management software through the East Texas Research Center in the Ralph Steen Library, an online database was created for use by the department and researchers. This project was undertaken to better organize department specimens and to allow for broader and more accessible use in research and classrooms.

P240 – THE IMPACT OF MARKET INTEGRATION ON SCHOOL-AGE CHILDREN'S GUT MICROBIOTA AND GROWTH AMONG THE AMAZONIAN SHUAR

AUTHORS: Emma Shoemaker[1], Fernanda Miron[1], Samuel Urlacher[1] (1. Baylor University)

ABSTRACT

Market integration (MI), the coalescence of global economies, is altering labor and product availability among low-to-middle income countries (LMIC). Furthermore, it is thought to mediate gut microbiome composition, contributing to the adult obesity and childhood growth faltering epidemics. However, the MI variables pertinent to enterotype presentation and metabolic health remain unclear. Here, we show that measures of diet and pathogen exposure demonstrate significant associations with microbiota composition, along with differences among rural-urban samples and growth. We characterized the fecal microbiome of "rural"-living and peri-"urban"-living (n = 89) Indigenous Shuar children of Amazonian Ecuador (age 4-12 years) using 16S rRNA gene sequencing. Urban-rural differences were found in the abundance of multiple genera of Proteobacteria and Firmicutes (pFDR<0.05). Moreover, children consuming relatively more market foods had a lower abundance of fiber fermenters and short-chain fatty acid producers, including Desulfovibrio, Ruminobacter, and Treponema (pFDR<0.05). Children from homes with improved (non-dirt) floors had reduced abundance of Akkermansia muciniphila (pFDR<0.05), a bacterium that is protective against obesity and chronic inflammation. Children who were stunted had greater abundance of genera that included Ruminobacter and Campylobacter (pFDR<0.05). With these findings, we present research which directly investigates MI-related pathways among school-age children, the age group for which lifetime metabolic patterns typically emerge, illuminating potential mechanisms by which environmental enteric dysfunction and the dual burden of growth faltering and later life obesity may occur. Furthermore, we contribute to the collective understanding of the human microbiome, in which LMIC and ethnic group-controlled data are underrepresented.

P241 – VOCALIZATION SIGNATURES OF FROG SPECIES: A STUDY OF CALL PATTERNS FOR SPECIES IDENTIFICATION AND BIODIVERSITY MONITORING IN A TEMPERATE WETLAND ECOSYSTEM

AUTHORS: Sunshyne Gwinn[1], Joel Brant[1] (1. McMurry University)

ABSTRACT

Frog vocalizations are used for species identification, communication, and mate selection, providing a valuable tool for ecological studies and biodiversity assessments. This study investigates the use of frog vocalization, specifically calling patterns, to distinguish between frog species within a shared habitat. We recorded the calls of multiple frog species from different genera in a temperate wetland ecosystem over several months using the Song Meter Mini (Wildlife Acoustics). Calls were analyzed for key acoustic features, including frequency, duration, and call structure in the Kaleidoscope Pro software. Results revealed significant interspecies variation in call characteristics, with each species displaying unique call signatures. Our findings demonstrate that specific acoustic parameters, such as pulse rate and dominant frequency, can reliably differentiate between species even in the presence of overlapping ecological niches. These results suggest that acoustic monitoring can be a non-invasive, efficient tool for species identification, monitoring population dynamics, and conserving amphibian biodiversity. Further research will focus on refining these techniques for use in automated bioacoustics monitoring systems in their native habitats.

P242 – A COMPARISON OF RURAL AND URBAN BIRD COMMUNITIES IN THE BIG COUNTRY

AUTHORS: Caleb Dale[1], Joel Brant[1] (1. McMurry University)

ABSTRACT

The purpose of this research is to analyze and characterize urban versus rural bird communities in the Big Country. We placed 6 bird detectors in various urban and rural locations (3 each) within Taylor and adjacent counties. The detectors are the Song Meter Mini from Wildlife Acoustics (wildlifeacoustics.com) and the recordings are saved on hour long files over 10 days and analyzed on BirdNet (birdnet.cornell.edu). The BirdNet ID proposed by the program was accepted if the confidence level was over 75%. These traps are active for 10 days and checked once per month. We are actively analyzing the diversity of birds within urban and rural environments in order to compare the effect of urban environments on rural bird species and calculate the richness and evenness of species in the two environments. This research began in August 2024 and the data is just now being analyzed. This poster will present preliminary data for this project. We aim to calculate the diversity of urban and rural birds and understand the effects of urbanization on the bird communities in the Big Country.

P244 – EXTRAORDINARY EXTRACTION EFFORTS: EXPERIMENTS TO ENHANCE DNA EXTRACTION FOR TISSUES OF APPLE SNAILS OF CONSERVATION INTEREST

AUTHORS: Kylie Allemeier[1], Katelin Pilarski[1], Rachel Ling[1], Sarah Berver[1], Romi Burks[1] (1. Southwestern University)

ABSTRACT

Successful efforts to conserve native species or combat non-native invasives depend on proper species identification. Apple snails [genus Pomacea, Family Ampullariidae] include highly invasive species (P. canaliculata and P. maculata) that continue range expansion, and several undescribed native species. Due to the cryptic nature of these species and the considerable phenotypic plasticity within species, accurate taxonomic identi?cation remains challenging without incorporating genetic data. Furthermore, modern species concepts rely on data generated by DNA barcoding (i.e. PCR amplification of a known genetic region that is then sequenced) to describe evolutionary relationships between species. Successful sequencing of target barcoding genes (cytochrome c oxidase 1 (CO1) in the case of apple snails) depends heavily on the quality of DNA extracted from individuals. Our previous successful efforts to identify snails from Texas and across the southeastern United States, as well as from South America, employed a particular kit to extract DNA primarily from unpigmented tissue taken from the muscular foot of individual snails. With new samples collected from Belize, we successfully used the same approach on individual hatchlings and extracted ample quantities of sufficient quality DNA that produced successful PCRs and returned readable sequences. However, these same kits mysteriously failed to produce usable quantities of DNA (at least 3.00 ng/uL) for “control” tissue samples. Our current troubleshooting efforts seek to explain this mystery and find or develop an extraction protocol so that we can successfully extract tissue from native snails to confirm their identity and aid in their conservation in Belize.

P245 – POTENTIAL DISRUPTORS OF THE ACOUSTIC HABITAT OF CAROLINA WRENS AND THE IMPLICATIONS FOR REPRODUCTIVE ISOLATION

AUTHORS: Zachary Seidel[1], Diane Neudorf[1] (1. Sam Houston State University)

ABSTRACT

Vocalizations play a vital role in the initiation of mating in passerine species. Because song repertoires are culturally inherited, and female song preference is determined during development, conspecific songs which are not native to the acoustic habitat of a female may not trigger a mating response. As such, any fragmentation of the acoustic habitat of a species may result in the formation of cultural barriers which impede breeding between the separate populations. This study aims to construct linear models from data collected through citizen science efforts to determine what geographic features disrupt the sharing of songs between populations of Carolina wrens (Thyrothorus ludovicianus), and whether behavioral responses to broadcasts of novel song types differ from songs native to the acoustic habitat observed. Results are forthcoming.

P246 – RODENT HABITAT SELECTION IN THREE COUNTIES (CALLAHAN, COLEMAN, AND TAYLOR) IN TEXAS

AUTHORS: Ansynn Franklin[1], Joel Brant[1] (1. McMurry University)

ABSTRACT

This study investigates the application of ultraviolet (UV) powder tracking of mice after capture. The use of UV powder allows for the non-invasive monitoring of movement patterns, interactions, and environmental preferences in various experimental settings. Mice were captured using Sherman live traps in three counties: Callahan, Coleman, and Taylor. These mice were dusted with a safe, luminescent UV powder and released at the point of capture. As the mice navigated their environment, the dust would fall off, leaving a detectable trail. After dark, we would use UV flashlights to find this trail and follow it, placing flags periodically to mark their trail. The next day, an aerial photograph was taken using a drone, to visualize the trail from above. These photographs were then edited using photo editing software to measure the distance traveled and habitats visited by these mice. The findings demonstrate that UV powder tracking not only facilitates the observation of natural behaviors without the stress of traditional tracking methods but also enhances the accuracy of data collection. This technique holds potential for advancing research.

P251 – CHARACTERIZATION OF THE SMACKOVER FORMATION IN UPSHUR COUNTY, TEXAS USING CORE AND GEOCHEMICAL DATA

AUTHORS: Eric Browning[1], Julie Bloxson[1] (1. Stephen F. Austin State University)

ABSTRACT

The Smackover Formation is a prolific carbonate hydrocarbon reservoir across the US Gulf Coast, and has recently been identified an abundant lithium brine resource. With the growing use of electric cars, lithium is in high demand and there is need to determine alternative resources. However, the source of the lithium in the brines is unknown. In the Smackover, one of the prevailing hypotheses is that dolomitization fluids is the source of lithium. ?The goal of this research is to understand the depositional environment of the Smackover and determine dolomitization using core and core analyses on a core from Upshur County, TX. Core descriptions, thin sections, and X-Ray Diffraction (XRD) are used to determine depositional environment and diagenesis. This is phase one to determine extent of dolomitization in the Smackover in the Ark-La-Tx region. The base of the Smackover in the core is primarily a mudstone, with few fossils and allochems. At this point, the formation is largely comprised of calcite (~90%) with quartz (~ 10%). The quartz concentration decreases up section. As shallower depths, the Smackover is a packstone containing ~15% fossils and ~60% oolites. Here, the dolomite concentration increases to ~15% and the quartz content is ~1%. The formation is still primarily calcite. These represent a transition from offshore marine setting depositing micrite in a low-energy environment, to a high-energy oolitic shoal, allowing for constant movement of grains and precipitation of calcite. Overall, minor dolomitization has occurred in this region of the Smackover.

P253 – UV-VIS SPECTROPHOTOMETRY FOR KINETIC STUDY OF THE DUSHMAN REACTION

AUTHORS: Lily Sowell[1], Byron Rogers[1] (1. Lubbock Christian University)

ABSTRACT

The Dushman reaction describes the interaction between the iodide and iodate ions in acidic solution: 5I>-> + IO₃>-> + 6H>+> ? 3I₂ + 3H₂O Under normal conditions, this reaction is in the fifth order overall, with a second-order rate law with respect to iodide. However, at micromolar iodide concentrations (proposed to be near 5 × 10>-7> M), the reaction follows a different mechanism and becomes first order with respect to iodide. The aim of this study is to use UV-vis spectrophotometry to measure the rate of the reaction at micromolar I>-> concentrations, and to use that rate to find the precise concentration at which the rate law of the reaction changes. Seven concentrations of I>-> will be tested in triplicate: for each trial, aqueous potassium iodide, potassium iodate, and perchloric acid will be combined in a spectrophotometry cuvette, and the reaction will be allowed to run to completion inside a UV-vis spectrophotometer. The initial absorbance and the absorbance at 30 seconds will be used to determine the reaction rate, and a calibration curve comparing the rate to the initial concentration of I>-> will be created; this graph will be used to determine the concentration of interest. This research will serve to lend credibility to the spectrophotometric method of testing the rate of the Dushman reaction as it is used in chemical engineering applications, as well as providing data on which to base the usage of UV-vis spectrophotometry for other kinetic studies in a classroom or student lab setting.

P256 – PAX6 IN SALAMANDER INNER EAR: A DEVELOPMENTAL AND COMPARATIVE STUDY

AUTHORS: Kimia Feiz[1], Brittany A. Dobbins[2], Ruben U. Tovar[2], Thomas J. Devitt[2], David M. Hillis[2], Dana M. García[1]) (1. Texas State University, 2. University of Texas at Austin)

ABSTRACT

Hearing loss affects millions of people worldwide, often due to damage to inner ear cells. While humans cannot regenerate these cells, salamanders possess remarkable regenerative capabilities. PAX6 is a transcription factor known for its role in the development of the eye, with growing evidence for its role during the development and regeneration of inner ear cells. We recently observed labeling of PAX6 in the inner ears of developing salamanders from the genus Eurycea of central Texas. This radiation of paedomorphic salamanders has subterranean adapted species exhibiting drastically reduced non-functioning eyes. PAX6 is known to play a role in the underdeveloped eye of the cavefish Astyanax mexicanus, which is compensated by the expansion of the lateral line. Similarly, compensation of eye-loss in cave-adapted salamanders could be associated with the inner ear's vestibular system. Preliminary data using microCT scanning suggest the inner ear of E. nana and E. rathbuni is well developed. However, the potential role of PAX6 in the development of the inner ear within Eurycea is still unknown. To test for the presence of PAX6, we used immunohistochemistry and confocal microscopy to analyze a developmental series of embryos and larvae of surface-dwelling E. nana and the subterranean E. rathbuni. We observed PAX6 in the inner ear of both species at 3 months post-oviposition. By examining both species, we aim to elucidate the role of PAX6 in inner ear development. Finally, by investigating PAX6, we aim to gain insights into the role of this protein during development and regeneration.

P257 – VARROA MITE PREVALENCE FERAL CENTRAL TEXAS BEE COLONIES

AUTHORS: Caleb Bell[1], Chad Cryer[1] (1. Temple College)

ABSTRACT

Native bee populations are essential to ecosystem health and agricultural productivity, yet they are experiencing alarming declines worldwide. One of the key drivers of this decline is the parasitic varroa mite (Varroa destructor), which infests native bee species. Varroa mites weaken native bees by compromising their immune systems, reducing reproductive success, and increasing vulnerability to pathogens like deformed wing virus. This study focuses on evaluating the varroa mite infestation in feral bee colonies in Milam County during the summer of 2024. Our data suggests that feral bee colonies may have adapted natural mechanisms for controlling mite levels within the hive. These findings highlight the importance of studying wild bee populations to inform better management practices for honeybees and improve conservation efforts for native species globally.

P258 – INDOLE VARIANT-SPECIFIC EFFECTS ON FUSOBACTERIUM NUCLEATUM BIOFILM GROWTH, VIRULENCE EXPRESSION, AND INVASION OF INTESTINAL EPITHELIAL CELLS

AUTHORS: Gregory Zaharas[1], Jessalyn Hawkins[1], Colin Scano[1], Leigh Greathouse[1] (1. Baylor University)

ABSTRACT

Fusobacterium nucleatum (F. nucleatum) is a Gram-negative, non-motile, anaerobic bacterium commonly found in the human oral cavity. It is both a natural constituent of the oral microbiota and an opportunistic pathogen frequently isolated from patients with various infections, including colorectal cancer (CRC). Indole is a bicyclic aromatic bacterial signaling molecule commonly produced by the gut microbiome and is known to affect bacterial virulence. Indole metabolite production is differentially abundant in CRC patients compared to healthy patients, which corresponds with shifts in abundance of species of the microbiome suggesting a role for microbial indoles in colorectal carcinogenesis. F. nucleatum secretes indoles within the tumor microenvironment, but the effects of these indole variants on its virulence and CRC-associated traits remain unclear. Interestingly, our preliminary data on how indole isolates affect F. nucleatum invasion of Caco-2 cells indicate that I3CA inhibits the invasion of a disease-associated isolate into CRC cells after two hours ($p<0.05$). Indole, indole-3-aldehyde (I3A), and I3CA inhibit invasion after four hours ($p<0.01$, $p<0.001$, $p<0.001$). I3CA is the primary metabolite of interest as a result. This project investigates I3CA's effect on F. nucleatum virulence factor expression, or expression of adhesins that allow F. nucleatum to invade. Virulence expression is also measured by biofilm growth, which virulence adhesins contribute to. This project also investigates F. nucleatum's invasion mechanism and how indole affects this.

P259 – THE IMPORTANCE OF CANOPY WIDTH AND CONNECTIVITY FOR BIODIVERSITY IN URBAN RIPARIAN HABITATS

AUTHORS: Maya Flores[1], Thomas Garrison[1], Mary Poteet[1] (1. University of Texas at Austin)

ABSTRACT

Riparian zones, especially those within urban environments, are vital for biodiversity conservation and providing critical ecological services. When these zones include forests, they can support complex flora-fauna relationships, acting as ecological corridors that facilitate species movement and strengthen ecological connectivity. Previous research has largely focused on a forest as an ecosystem within a natural setting, leaving a gap in the understanding of how these characteristics influence biodiversity in an urban environment. We hypothesize that as canopy connectivity and canopy width increase, biodiversity also increases because a wider, more connected ecosystem can sustain more species. To test these hypotheses, we acquired canopy and species data along Waller Creek from iNaturalist and UT Treekeeper. These were integrated into a geographical information system (GIS), where we rasterized the canopy data to determine connectivity. Analysis of species density and distribution of the iNaturalist data reveals that the riparian forest characteristics of connectivity and canopy width are positively correlated with biodiversity, where the highest connectivity co-occurred with the highest point density. Our results confirm the hypotheses, however, they also highlight the limitations of processing citizen science data. We anticipate that these findings are crucial for developing conservation strategies in rapidly urbanizing areas where natural habitats are increasingly fragmented while also showcasing the potential for citizen science in future ecological research.

P265 – AIRBORNE ENVIRONMENTAL DNA COLLECTION FOR AQUATIC TARGETS IN A NATURAL SETTING

AUTHORS: Olivia Lightfoot[1], Amia Barrio[1], Matthew A. Barnes[1] (1. Texas Tech University)

ABSTRACT

Environmental DNA (eDNA) refers to traces of genetic material that organisms shed into their surroundings. The collection and analysis of eDNA has emerged over the past decade as a sensitive, non-invasive method for the study and management of organisms. To date, most eDNA research has focused on eDNA collection and analysis from water and sediment samples; however, airborne sampling has recently emerged as a novel method for the study of terrestrial plants and animals. In a proof-of-concept study, we previously demonstrated that airborne eDNA could be collected from aquatic organisms in a laboratory setting. In our current study, we aimed to further investigate the potential of airborne eDNA analysis for aquatic organisms by examining whether eDNA from organisms present in a natural environment can be successfully collected from the air. Specifically, we collected paired air and water samples along the downwind shore of Buffalo Springs Lake in Lubbock, TX, with a Smith-Root eDNA Sampler Backpack. Both sample types were analyzed for the presence of eDNA from lake resident striped bass Morone saxatilis using quantitative polymerase chain reaction (qPCR). In addition to comparing detection rates between water and air samples, we also compared the use of two different filter sizes (2.5 vs. 5.0 µm) for processing both sample types. The collection and analysis of aquatic eDNA through air sampling may provide an alternative method to direct sampling of water, facilitating sample collection in difficult habitats and potential automation of sample collection and analysis.

P266 – EFFECTS OF ANGIOTENSIN LL IN THE DEVELOPMENT OF ATHEROSCLEROSIS/ATHEROTHROMBOSIS

AUTHORS: Kennya Gomez[1](1. University of Texas Permian Basin)

ABSTRACT

Atherosclerosis is one of the main causes of blockages in arteries derived from saturated fat diets, high blood pressure, diabetes, high cholesterol & triacylglycerols, and lack of exercise. It mainly affects smooth muscle cells (SMC) found under the lining of endothelial cells. It is speculated that proliferation of SMC is intrinsic to cardiovascular diseases such as atherosclerosis. The purpose is to be cognizant with the mechanisms of cardiovascular diseases by analyzing connections between the effects of Ang ll in SMC proliferation and migration and related blood pressures leading to thrombosis from mouse models. Detecting proteins in the vascular walls contributes to the analysis in the process of build ups of vulnerable plaques. Through our studies, by performing western blots, we are able to determine p38 activation and tissue factor expression in response to Ang ll and FBS stimulation in cells which elucidate the mechanism and progression of Atherosclerosis and thrombosis. Mice are kept on high fat diets for 28 days and osmotic pump which increases levels of Ang ll are inserted for another 28 days. Comparisons are then made

before and after induction of Ang ll into their system by taking blood pressure readings. Results demonstrate Ang ll leads to increases in mean arterial pressure causing vasoconstriction. The kinase detection plays a role through cell responses to inflammation and other metabolic stresses. With future studies, we hope to continue understanding and finding other leading causes over the development of Atherosclerosis/Thrombosis as one of the leading causes of death in our world.

P269 – EXAMINING THE EFFECTS OF THE APOE4 GENOTYPE ON HYPERGLYCEMIA-INDUCED AFFECTIVE AND MITOCHONDRIAL DYSFUNCTION IN MALE MICE

AUTHORS: Matthew Folh[1], Jonathan Duhon[1], Laura Kusumo[1], Elisabeth Vichaya[1] (1. Baylor University)

ABSTRACT

Individuals with diabetes have a 65% higher risk of developing Alzheimer's disease (AD). The E4 allele of the ApoE gene is the leading genetic risk factor for late onset Alzheimer's disease and is also associated with increased risk for diabetes and depression. We sought to determine if this high-risk allele is also associated with worse hyperglycemia-related cognitive and affective symptoms using a murine model. We used a 2 (+/- hyperglycemia) x 2 (ApoE4/wild-type [WT]) factorial design in male C57BL/6J mice. Hyperglycemia was pharmacologically induced by administration of 50 mg/kg/day streptozotocin (STZ) in a citrate buffer, a drug that preferentially ablates pancreatic beta cells, for 5 consecutive days. Control mice were treated with an equal volume of vehicle. Four weeks later, mice underwent behavioral testing, including marble burying, open field, nest building, and forced swim. Following behavioral tests, brain tissue was collected for evaluation of neuroinflammation, lipid accumulation, and mitochondrial structure. Results demonstrate that both WT and ApoE4 mice developed STZ-induced hyperglycemia (blood glucose levels > 250 mg/dL) and depressive like-behavior. Preliminary evaluation of transmission electron microscopy (TEM) suggests impaired mitochondrial structure within the hippocampus of STZ treated mice; however, statistical confirmation is still pending. However, limited differences were observed between the genotypes. Our next step is to evaluate these effects in the ApoE3 allele, the most common human isoform, to further elucidate the effects of the ApoE genotype in hyperglycemia-induced cognitive and affective behavior.

P270 – DEVELOPMENT OF OXONOL FLUOROGENIC PROBE FOR HYDROGEN PEROXIDE DETECTION IN-VITRO

AUTHORS: Biakengzaua Khupngai[1], Mohan Kodisana[2], Syed Usama[2] (1. University of Texas San Antonio, 2. The University of Texas at San Antonio)

ABSTRACT

Cancer remains the leading cause of death globally, and we continue to face challenges in finding effective diagnostic and therapeutic. The tumor microenvironment (TME) plays a significant role in tumor initiation and eventual metastasis spread. Cancer cells produce hydrogen peroxide at high concentrations, acting as a reactive oxygen species (ROS), causing DNA damage and promoting tumor formation. Diverse dye scaffolds based on cationic backbones have been used to study the intracellular environment. However, the use of hydrophilic anionic fluorophores as extracellular probes for tumor microenvironment studies remains limited. Herein, we synthesized a novel class of stable, modified polymethine oxonol dye with pyrazole backbone, which we functionalize into two fluorogenic probes for studying the tumor microenvironment. These probes are highly specific and only show fluorescence when they are turned "on" in the active site. The probes are stable under media conditions and show high fluorescence intensity with increasing hydrogen peroxide (H₂O₂) and nitroreductase (NTR) concentrations in buffer solution (pH 7.2). In the "off mode," the fluorogenic probes absorb at 450 nm with a low fluorescence signal. Upon exposure to H₂O₂or NTR, the probes activate to the "on mode" absorbing at 640 nm and displaying a stronger fluorescence band at 660 nm. The probes are selective to hydrogen peroxide and nitroreductase over other extracellular analytes with a high activation ratio (ratio of probe fluorescence in "on" mode to "off" mode). Further studies will be performed to investigate and evaluate H?O? and NTR levels using the probes after chemotherapy treatment.

P272 – VISCOSITY-SENSITIVE CY3 FLUOROPHORES FOR CELL MEMBRANE LABELING

AUTHORS: Mohan Kodisana[1], Syed Usama[1] (1. The University of Texas at San Antonio)

ABSTRACT

Long-term tracking of cell membranes is crucial for studying cell membrane (CM) function and diagnosing membrane-related diseases. However, existing fluorophores used for CM labeling often diffuse into the cytoplasm, which is undesirable. Viscosity is a key factor that governs the diffusion rate of molecules through the cell membrane, thus influencing the rates of diffusion-controlled processes. In this study, we tuned the Trimethine cyanine (Cy3) scaffold by modifying the meso-position of the polymethine chain to construct viscosity-sensitive probes that are photostable and fluorescence in viscous media. We developed a new method to modify to synthesize meso-modified polymethine chain. In the initial testing, we mimicked the cell membrane condition by using 20%, 50%, and 80% glycerol concentrations. We observed improvements in extinction coefficients, quantum yields, and brightness. Our lead probe with strong sensitivity to viscosity changes, excellent water solubility, and significant fluorescence response to viscosity making it highly suitable for probing membrane dynamics and cellular viscosity. Overall, this work offers a rational design strategy for viscosity-sensitive fluorescent Cy3 probes for cell membrane labeling. Our future experiments will demonstrate that these viscosity-sensitive Cy3 probes can selectively visualize cancer cell membranes, revealing that tumor cell membranes are more viscous than those of normal cells. In the future our ongoing research will provide insights into the changes in membrane viscosity during cancer progression, and introduce a new method for selective visualization of tumor cells, advancing cancer diagnosis.

P274 – SKELETAL MORPHOLOGY OF TETRACHEILOSTOMA CARLA (TYPHLOPIDAE, SERPENTES, SQUAMATA), THE WORLD'S SMALLEST SNAKE

AUTHORS: Caleb Shoemaker[1], Juan D. Daza[1] (1. Sam Houston State University)

ABSTRACT

Tetracheilostoma carlae was first described by S. Blair Hedges sixteen years ago from Barbados. It is the smallest species of snake currently know, with a total length of 104 millimeters at maximum and a maximum snout-vent length of 98 millimeters. In this study, we use high-resolution computed tomography of two specimens, the holotype (USNM564819) and the paratype (USNM564818), to study the cranial and axial skeletal anatomy of this species. The morphology of the snout is narrow but expands at the neurocranial region. The antero-medial process of the parietal wedges between the frontals. The nasals, rather than being perforated by multiple foramina as in other Typhlopids, are solid and have an opening in the lateral side of the nasofrontal suture. Each dentary bears five procumbent teeth, and no teeth are present in the premaxilla or maxilla. Compared with Typhlopids of similar size (Antillotyphlops grantii), the posteromedial border of the parietal is rounded rather than transverse, and the supraoccipital bones are absent. We will continue investigating the individual cranial elements to produce a detailed description of the skull.

P275 – BONE FRACTURE TRENDS IN ELDERLY INDIVIDUALS WITH ARTHROPLASTY

AUTHORS: Theresa de Cree[1] (1. Texas State University)

ABSTRACT

As life expectancy increases, diseases and conditions associated with older age rise concurrently. Arthroplasty, or joint replacement surgery, can be used to treat arthritic joints that have degraded and cause pain. The occurrence of this procedure has been steadily increasing as well, and while follow-up after arthroplasty is common in the medical field it is not widely standardized and usually is limited to the two years following the procedure. Therefore, the sometimes decades-long impact of a joint replacement on the human skeleton is not well understood. The knowledge of the effects of a replacement on skeletal tissue, both local to the implant and systemically, is even less understood in Forensic Anthropology, as few studies address this issue. In this research, a sample of 100 individuals from a donated skeletal collection were analyzed for the presence of joint replacements and fractures. Both fractures that occurred before and around the time of death were observed. This presentation will highlight the trends of fractures in relation to age, sex, and the presence of joint replacements. These trends will illuminate fracture analysis in Forensic Anthropology for elderly individuals. This research serves as a basis for future investigations into the influence of medical devices on trauma and pathology analysis. The result of this study will impact both Forensic Anthropology and the medical field, as the understanding of arthroplasty on fracture rates can improve analysis in death investigations and considerations for orthopedic practitioners for best practices in arthroplasty follow-up.

P278 – ECOLOGICAL NICHE MODELING OF SELECTED WEST COAST ANGIOSPERMS

AUTHORS: Mason Scott[1], Samantha Hamilton[1] (1. McMurry University)

ABSTRACT

We aimed to build ecological niche models (ENM)s for a set of angiosperms from the floras of California and Oregon to be used in an endemicity analysis (EA) and to better understand the species ecological requirements. EA seeks areas of endemism (AE)s with many species found nowhere else. AEs are useful for conservation decisions. We built a dataset with 64,552 specimen point records of 84 species of 15 families, then downloaded and cleaned their digitized point records from iDigBio database. We chose 12 noncorrelated environmental variables out of 18 layers from Worldclim database and clipped them to temperate North America using QGIS. Using the layers, we build and evaluated the ENMs for the species in our dataset using MaxEnt algorithm. We then sorted the models and obtained 11 types of models based on the geographic location judging from their pictures. The similar models were found in the following areas: California Coast, the Great Basin, California Coast into the Great Basin, California Coast through the Rocky Mountains, California Coast through the Great Plains, California Coast through the Great Plains including the Central Lowlands, California Coast through the Great Plains to the Appalachians, and California Coast through the Great Plains including the Central Lowlands area, Appalachians, and just above the Great Lakes into Canada. Some species of the Asteraceae and Grossulariaceae showed wider geographic ranges, while those in Apocynaceae and Araliaceae were confined to the California Coast.

P279 – EARLY-LIFE COMMUNICATION AT CRITICAL DEVELOPMENTAL TIMEPOINTS AMONG NS-PTEN MICE

AUTHORS: Taylor Bradish[1], Gautham Chelliah[1], Chloe Lau[1], Colton Kelley[1], Joshua Thayil[1], Joaquin Lugo[1], Katherine Blandin[1] (1. Baylor University)

ABSTRACT

Epilepsy is characterized by the predisposition to have recurrent seizures. Dysregulation of the mechanistic target of rapamycin (mTOR) pathway has been linked to both neurodevelopmental disorders and epilepsy. A deletion or mutation of the phosphatase and tensin homolog (PTEN) on chromosome ten is a suppressor of the mTOR pathway that has also been linked to epilepsy. Seizures in early development have been found to lead to autistic-like behavioral and communication deficits. This study aimed to characterize the communication alterations found in the neuronal subset-specific deletion of PTEN (NS-PTEN) across critical points of early development which has previously not been addressed. To do this we analyzed ultrasonic vocalizations (USVs) in postnatal day 10 and 12 (PD10/12) mouse pups across genotypes. Our results found age differences between vocalization types across genotypes. Of note, analysis of the distribution of call types found that PD10 female knockout (KO) pups had more complex, composite, and frequency steps calls, and less chevron and upward calls than at PD12 ($p<.05$). Male PD10 KO were found to have more chevron, complex, frequency step, and two-component calls, and less short and upward calls than at PD12 ($p<.05$). Similar results were found in wildtype and heterozygous pups. Our findings indicate that at critical, early developmental timepoints a NS-PTEN deletion can result in a change in vocalization patterns. These results give a more comprehensive understanding of the developmental profile of USVs in NS-PTEN mouse pups among genotypes. It also provides evidence of a connection between neonatal USVs and hyperactive mTOR signaling.

P281 – INVESTIGATING THE EFFECTS OF THE APOE4 GENOTYPE ON HYPERGLYCEMIA-INDUCED DEPRESSIVE LIKE BEHAVIOR AND NEUROINFLAMMATION IN FEMALE MICE

AUTHORS: Jonathan Duhon[1], Matthew Folh[1], Laura Kusumo[1], Elisabeth Vichaya[1] (1. Baylor University)

ABSTRACT

Recent studies show a linkage between Alzheimer's disease (AD) and both type I and type II diabetes, such that diabetic individuals have a 65% higher risk of developing AD. More research is needed to understand the neurobiological basis for this comorbidity, particularly in female mice as approximately 2/3 of Alzheimer's patients in the United States are female. The ApoE4 genotype has been found to be a critical genetic risk factor for late onset AD, with 40-65% of all AD patients being ApoE4+. We aimed to determine if the ApoE4 genotype exacerbated the cognitive and affective symptoms in diabetic female mice using a 2 (+/- hyperglycemia) by 2 (WT C57BL6/J vs ApoE4) design (n=10-13 mice/group). To induce hyperglycemia, 70 mg/kg/day streptozotocin (STZ) was administered over a 5-day period to the treatment mice. The control mice were treated with an equal amount of citrate buffer over the same time period. Four weeks after STZ injection we confirmed hyperglycemia (>250 mg/dL), and behavior was evaluated via the open field, contextual fear conditioning, and marble burying tasks. STZ was associated with

reduced marble burying and enhanced fear conditioning. An unexpected STZ by genotype interaction was observed for immobility in the open field test, such that STZ decreased immobility in the ApoE4, but not the WT genotype. Analysis of tissues are ongoing. Our goal is to continue this study through the addition of an ApoE3 genotype group and to examine brain region specific changes in inflammation and mitochondrial function.

P286 – EXPLORING THE POTENTIAL OF NOVEL 2D TRANSITION METAL COMPOUNDS (2DTMCS) FOR ADVANCED ENERGY AND CATALYTIC APPLICATIONS: A COMPUTATIONAL STUDY ON STABILITY AND ELECTRONIC PROPERTIES

AUTHORS: Puja Rijal[1], Uvin Dealwis[1], Kevin Shuford[1] (1. Baylor University)

ABSTRACT

The rapid advancement of technology has sparked considerable interest in two-dimensional (2D) materials, particularly 2D Transition Metal Compounds (2DTMCs), renowned for their exceptional physical and chemical properties. Among these, a novel subclass known as XMenes, defined by the general formula MX (M: transition metal, X: non-metal), has emerged as a promising candidate for diverse applications. Our research focuses on engineering innovative 2DTMCs derived from XMenes, specifically with compositions M?.?M?.?X?, to enhance their utility in advanced energy and catalytic technologies. Through high-throughput computational screening, we systematically investigate the stability and electronic properties of these novel 2DTMCs, building on 24 previously identified stable XMenes. Earlier work from our group highlighted 19 stable 2DTMCs with metallic properties and catalytically active basal planes, demonstrating significant potential in electrocatalysis and energy storage.Expanding this foundation, our study explores the structural and electronic evolution of these 2DTMCs, providing a comprehensive analysis of their bonding characteristics and electronic configurations. By comparing these engineered 2DTMCs to their pristine counterparts, we uncover valuable insights into how their unique properties can be fine-tuned to achieve superior performance in energy storage, catalysis, and electronic applications. Our findings not only contribute to the growing body of knowledge on 2DTMCs but also highlight their transformative potential for next-generation technologies. Our study highlights the critical distinctions between alloyed and non-alloyed systems, paving the way for innovative applications and further research.

P288 – SYNTHESIS AND COMPUTATIONAL ANALYSIS OF DIAZABOROLIDINES DERIVED FROM PHENYLBORONIC ACID DERIVATIVES AND 1,2- AND 1,3-DIAMINES

AUTHORS: Ravindu Pathirana Hewage[1], Dustin Gross[1] (1. Sam Houston State University)

ABSTRACT

Diazaboroles are important due to the unique potential applications they offer in a variety of fields, particularly in semiconductors, optical materials, and polymer sensors. The formation of diazaboroles through the condensation of phenylboronic acids with ortho-phenylenediamines is well-established. However, to our knowledge, the synthesis of diazaborolidines from phenylboronic acid (or its esters) and ethylene-based diamines remains unexplored. Here, we investigate the formation and stability of diazaborolidines using different diamines, utilizing experimental and computational methods. >1>H NMR spectroscopy and density functional theory calculations (B3LYP/6-311+G) revealed that bulky ethylenediamines do not readily form a condensation product. However, reactions of less bulky ethylenediamines with phenylboronic acid yielded triphenylboroxine–amine adducts instead of targeted diazaborolidines. Moving forward, we aim to utilize XRD to characterize these adducts further.

P291 – VARIATIONS IN ASSIGNMENT EXPECTATIONS AS REPRESENTED BY RUBRIC STRUCTURE AND CONTENT IN GENERAL CHEMISTRY

AUTHORS: Chloe Sells[1], Michelle Herridge[1] (1. Baylor University)

ABSTRACT

Evaluation of student work is critical to supporting student learning and informing instructional practices. In order to better understand variation in assignment evaluation between instructors, we asked faculty and graduate student instructors to grade sample responses to exam questions that had been given in previous years. In preparing to evaluate the student responses, half of the instructors generated written rubrics and all instructors indicated some level of expectation when discussing the student answers. These rubrics and expectations varied greatly, despite all instructors using the same curriculum and having experience

with common exams. In this presentation we discuss preliminary findings of both content knowledge and student performance expectations for general chemistry exams as expressed by instructors.

P296 – IMPROVING CKKS PERFORMANCE WITH VECTOR COMPUTATION AND GPU ACCELERATION

AUTHORS: Smaran Manchala[1] (1. Boston University)

ABSTRACT

Homomorphic Encryption (HE) enables computations on encrypted data without requiring decryption, mitigating data vulnerability during processing. Usable Fully Homomorphic Encryption (FHE) could revolutionize secure data operations across cloud computing, AI training, and healthcare, providing both privacy and functionality, however, the computational inefficiency of schemes like Cheon-Kim-Kim-Song (CKKS) hinders their widespread practical use. This study focuses on optimizing CKKS for faster matrix operations through the implementation of vector computation parallelization and GPU acceleration. The variable effects of vector parallelization on GPUs were explored, recognizing that while parallelization typically accelerates operations, it could introduce overhead that results in slower runtimes, especially in smaller, less computationally demanding operations. To assess performance, two neural network models—MLPN and CNN—were tested on the MNIST dataset using both ARM and x86-64 architectures, with CNN chosen for its higher computational demands. Each test was repeated 1,000 times, and outliers were removed via Z-score analysis to measure the effect of vector parallelization on CKKS performance. Model accuracy was also evaluated under CKKS encryption to ensure optimizations did not compromise results. According to the results of the trail runs, applying vector parallelization had a 2.63X efficiency increase overall with a 1.83X performance increase for x86-64 over ARM architecture. Overall, these results suggest the application of vector parallelization in tandem with GPU acceleration significantly improves the efficiency of CKKS even while accounting for vector parallelization overhead, providing impact in future zero trust operations.

P297 – INVESTIGATING NEUROINFLAMMATORY AND BEHAVIORAL OUTCOMES OF MOC2-7 TUMORS IN MALE C57BL6/J MICE: ABSENCE OF DEPRESSIVE-LIKE PHENOTYPE WITH EVIDENCE OF FATIGUE AND CACHEXIA

AUTHORS: Avery Gillett[1], Caroline Fowler[1], Cory Dungan[1], Elisabeth Vichaya[1] (1. Baylor University)

ABSTRACT

Head and neck squamous cell carcinoma (HNSCC) affects approximately 890,000 people annually. MOC2-7 (murine oral carcinoma 2-7) is a syngeneic model for HPV-negative HNSCC, and recent preclinical work using the MOC2-7 tumors has shown they are highly innervated with functional nerves projecting to limbic structures, including the amygdala. To that end, two studies were conducted using the MOC2-7 model. These studies sought to determine whether this dense innervation pattern promotes neuroinflammation and behavioral dysfunction. In Study 1, tumor-bearing male C57BL6/J mice showed significant weight loss, suggestive of cachexia, and increased spleen weight. Proinflammatory cytokine Il1b was elevated in the hypothalamus, indicating neuroinflammation. Despite these changes, tumor-bearing mice exhibited normal behavioral responses in open field activity, nest building, social activity, and fear conditioning. Given the lack of robust behavioral changes, Study 2 focused on cancer-related fatigue and cachexia. Mice were single housed with voluntary running wheels prior to tumor cell injection. Fatigue-like behavior was observed in the tumor-bearing mice, with significant differences in voluntary wheel running emerging within 22 days. Cachexia was confirmed in the tumor-bearing group through reduced muscle weights of the soleus, plantaris, and gastrocnemius muscles. Proinflammatory cytokines were elevated in the liver (Il1b, Il6, Tnf) and hippocampus (Il1b), indicating systemic and central inflammation. Despite the presence of significant inflammation in the hypothalamus, hippocampus, and liver, no behavioral changes beyond fatigue were detected. This suggests that cachexia, rather than neuroinflammation, may primarily drive the fatigue observed. A follow-up study is ongoing investigating stress responsivity in this tumor model.

P298 – THE EFFECTS OF TART CHERRY EXTRACT ON THE LIFESPAN AND GENE EXPRESSION OF CAENORHABDITIS ELEGANS MODELS OF ALZHEIMER'S DISEASE

AUTHORS: Abid Miah[1], Naima Moustaid-Moussa[1], Yujiao Zu[1] (1. Texas Tech University)

ABSTRACT
Alzheimer's disease (AD) is a progressive brain disorder associated with aging, characterized by the deposition of beta-amyloid (Aß) and tau protein, leading to neuroinflammation and neuronal dysfunctions. Tart cherry extract (TCE), rich in anthocyanins, can potentially improve mitochondrial function due to its antioxidant and anti-inflammatory properties, extending lifespan. We previously reported the life-extending effect of TCE in Alzheimer's C. elegans GMC101, expressing human Aß. In this study, we extracted the RNA from C. elegans treated with TCE at 6 or 12 µg anthocyanins/mL and assessed gene expression. We hypothesized that TCE extends the lifespan of C. elegans by modulating genes involved in stress resistance, metabolism, and longevity in a dose-dependent manner. Method: The AD strains of C. elegans were grown and age-synchronized before being loaded into NemaLife Infinity microfluid chips. Then the worms were fed 20 mg/mL of OP50 E. coli, either without TCE (control) or supplemented with 6 or 12 µg anthocyanins/mL of TCE. 90-second videos were taken of each group and analyzed using NemaLife software to quantify the number of living worms. The mean and median lifespan for each treatment group was determined using Prism GraphPad.Impact: TCE, rich in anthocyanin, has demonstrated beneficial effects in C. elegans, serving as a source of dietary antioxidants that can be used to extend longevity. Given its potential mechanisms, TCE may exhibit positive effects in humans, allowing for an extended lifespan and expression of protective genes that combat AD and other age-related diseases.

P300 – INVESTIGATING THE LONG-TERM EFFECTS OF PIFITHRIN-µ ON CISPLATIN-INDUCED COGNITIVE IMPAIRMENT

AUTHORS: Mia Tarantino[1], Caroline Fowler[1], Valeria Muniz[1], Mathew Chatham[1], Tanish Raina[1], Elisabeth Vichaya[1] (1. Baylor University)

ABSTRACT
Chemotherapy-induced cognitive impairment (CICI) is a common neurotoxic side effect of chemotherapy treatment that affects up to 78% of patients. Symptoms of CICI include deficits in attention, learning, processing speed, memory, and executive control. With the number of cancer survivors predicted to increase by approximately 25% within the next 10 years, we will have a growing need for post-cancer care. There is preclinical evidence that pifithrin (PFT)-µ, a mitochondrial p53 inhibitor, can prevent cognitive dysfunction induced by cisplatin, a platinum-based chemotherapy agent. However, these studies were conducted in young mice and did not include long-term follow ups. This long-term follow up is important as there is evidence that cisplatin accelerates brain aging. To test the hypothesis that PFT-µ can exert long-term cognitive protection and prevent chemotherapy-induced acceleration of brain aging, we treated middle-aged (13-14 months) female C57BL/6J mice with cisplatin and PFT-µ and evaluated cognitive function acutely as well as 3 months later. We used a 2 (+/- cisplatin) x 2 (+/- PFT-µ) experimental design with 7 mice/group. PFT-µ (8 mg/kg/day) was administered 1 hour before cisplatin (2.3 mg/kg/day) for 2 cycles of 5 days of administration, followed by 5 days of rest, for a total of 10 days of drug administration. While preliminary behavioral data indicate limited evidence of cisplatin-induced cognitive dysfunction 3 months post treatment, there is evidence that PFT-µ may attenuate age-related memory deficits. Tissue analyses of neuroinflammatory and senescent profiles are ongoing.

P301 – TRANSCRANIAL PHOTOBIOMODULATION (TPBM) REDUCES ANXIETY SYMPTOMS AND IMPROVES ATTENTIONAL CONTROL

AUTHORS: Kevin Thakkar[1], Anagh Mirji[1], Laura Gamboa[1], Roger Davis[1], Francisco Gonzalez-Lima[1]) (1. The University of Texas at Austin)

ABSTRACT
Anxiety disorders are among the most prevalent mental health conditions, significantly impairing daily functioning and quality of life. While treatments such as Cognitive Behavioral Therapy (CBT) and pharmacological interventions benefit some individuals, many experience limited efficacy or adverse effects. This highlights the need for accessible and innovative approaches. Transcranial photobiomodulation (tPBM) is a non-invasive neuromodulation technique that enhances mitochondrial bioenergetics in neurons of the prefrontal cortex (PFC) using near-infrared light. Building on prior research showing the cognitive and emotional benefits of tPBM, here we show its novel use to reduce anxiety symptoms and attentional bias, while investigating brain activity via functional near-infrared spectroscopy (fNIRS). In a randomized, single-blind, sham-controlled design, 70 participants (35 per group) will be assigned to receive either 8 minutes of active tPBM stimulation or sham condition targeting the right PFC. Anxiety symptoms will be assessed using the State-Trait Anxiety Inventory (STAI). Attentional bias will be evaluated

using the dot-probe paradigm, which measures reaction times to threat versus neutral stimuli. fNIRS will monitor hemodynamic changes in the PFC by tracking oxygenated hemoglobin levels as biomarkers of treatment effects. Pilot data suggest that tPBM reduces state anxiety and shifts attentional bias away from threat-related stimuli more than the sham condition. Trait anxiety scores remained stable. These findings support tPBM as a non-invasive, effective intervention for reducing anxiety symptoms and improving attentional control, with significant potential for broader clinical applications. Future studies will explore the combined effects of tPBM and attention bias modification (ABM) to further enhance anxiety-related outcomes.

P303 – THE IMPACTS OF DIEL THERMAL VARIABILITY ON ZEBRA MUSSEL SURVIVORSHIP AT THE UPPER LIMIT OF THEIR TOLERANCE: LINKING LABORATORY RESULTS TO NATURAL FIELD CONDITIONS IN TEXAS

AUTHORS: Chase Herrington[1], Cadence Sen[1], Amya McCarroll[1], Jason Locklin[1] (1. Temple College)

ABSTRACT

Zebra mussels (Dreissena polymorpha), native to the Black, Caspian, and Azov Seas of Europe, were first detected in North America in 1988 when they were inadvertently introduced into Lake St. Clair. They rapidly spread southward through the Mississippi River and its tributaries to reach Texas' Lake Texoma in 2009. The warm waters of low-latitude lakes were initially thought to prevent the long-term establishment of populations in Texas; however, zebra mussels have demonstrated a growing tolerance for elevated temperatures, leading to well-established, reproducing populations across at least 30 Texas lakes. This invasive species has since caused multimillion-dollar damages by biofouling infrastructure and has altered ecosystem structure in those lakes they've successful invaded. Many thermal tolerance experiments in the lab use constant temperature regimes to determine maximum thermal tolerances. However, such thermal regimes are inconsistent with what mussels experience in the field. We tested the thermal tolerance of the population in Stillhouse Hollow Lake under constant and fluctuating (±1C° daily) regimes to determine the impacts of these two thermal regimes on mussel survivorship during thermal tolerance testing. Overall, mussel longevity was significantly improved when temperatures were held constant at 30C°, 31C°, and 32C°, but significantly worse when held constant at 33C° and 34C° compared to the daily fluctuating regimes. These results suggest that when mussels are exposed to temperatures above their 32C°-33C° tolerance limit in Texas, the daily fluctuations they experience in the field may help to serve as an essential recovery period to help sustain their physiological function and overall survival.

P304 – TEMPERATURE-INDUCED STRESS AND THE STARVATION OF ZEBRA MUSSELS (DREISSENA POLYMORPHA) IN A CENTRAL TEXAS LAKE

AUTHORS: Cadence Sen[1], Amya McCarroll[1], Chase Herrington[1], Jason Locklin[1] (1. Temple College)

ABSTRACT

Invasive zebra mussel populations in southwestern U.S. waterbodies grow rapidly and have two annual spawning events, which leads to dense populations shortly after invasion. In Stillhouse Hollow Lake, for example, densities exceeded 65,000 mussels m>-2> just three years post-invasion. However, large-scale die-offs occur in these low-latitude populations after prolonged exposure to elevated summer water temperatures, even when temperatures remain below the species' maximum thermal tolerance. These die-offs, typically observed in early fall in Texas, suggest factors beyond temperature alone contribute to mass mortality. This study assessed the impact of elevated temperatures on the physiological condition of zebra mussels from Stillhouse Hollow Lake during the summers and falls of 2022-2024. We hypothesized that chronic exposure to warm temperatures increases metabolic demand and decreases feeding efficiency, leading to poorer physiological condition over the summer. Mussels were collected in June and September (2022-2024, n=55-60 per sample), and shell lengths and dry soft tissue weights were measured. Physiological condition was calculated as the dry tissue weight-to-shell length ratio. Daily air temperature data were obtained from NOAA. Significant declines in condition were observed between June and September in all three years with June ratios of 0.085 (2022), 0.074 (2023), and 0.069 (2024) compared to September ratios of 0.047 (2022), 0.056 (2023), and 0.043 (2024). These declines are likely due to starvation resulting from prolonged exposure to warm temperatures. Understanding zebra mussel dynamics in Texas is crucial for managing impacted aquatic systems in subtropical North American lakes.

P306 – BACTERIA GROWTH IN SCHOOLS

AUTHORS: Carlie Buck[1] (1. University of Texas of the Permian Basin)

ABSTRACT
As a future teacher I want to be able understand bacteria growth in my classroom and if cleaning helps and is effective in the classroom. Also, how often must it be cleaned to maintain my and my student's health. In order to test this I am going to swab two desk one that is clean, and one that is dirty in a classroom at the UTPB STEM Academy and two desk at the University of Texas of the Permian Basin. Then swab a nutrient agar plate and place in three different temperature settings, one at room temperature, in the fridge, and in an oven at 30 degrees Celsius. Then check every day for a week to see the growth at the different temperatures. After the experiment is performed I expect the bacteria to grow more at room temperature than the other two settings.

P307 – EMPOWERING SCIENCES STUDENT TRANSFERS: IDENTIFYING AND ADDRESSING TRANSFER RATE DISPARITIES IN A CENTRAL TEXAS COMMUNITY COLLEGE

AUTHORS: Trinity Vig[1], Sariah Kaipat[1], Jason Locklin[1] (1. Temple College)

ABSTRACT
Many Texas community colleges have been striving to improve student success and timely degree completion through national and statewide supportive initiatives. These efforts are crucial not only for students but also for Texas community colleges with recent legislative changes linking state funding primarily to student outcomes. At Temple College, these initiatives have led to improved certificate and degree completions. However, transfer rates to four-year institutions remain low (12.6% in Texas in 2019), despite over 80% of community college students having intentions to transfer. To better understand the transfer intentions of natural sciences majors at Temple College, we conducted a survey in Fall 2024 (N=1,392) that aimed to determine students' intentions, such as obtaining a certificate, degree, or transferring to a four-year institution. Given that many natural sciences community college students need to transfer to pursue careers in their fields, appropriate advising, including transfer planning, is crucial for them. Our results indicate that while 94% of Temple College natural science students intend to transfer, some simply plan to earn a certificate or associate degree, which are often insufficient for their career goals. Additionally, many students who intend to transfer do not follow through despite their strong academic performance at the community college. The survey suggests that early and appropriate advising should include comprehensive transfer guidance, discipline-specific transfer plans, and financial planning discussions. This approach can better support students in achieving their academic and career goals as transferring to a four-year institution is critical for those pursuing careers in the natural sciences.

P309 – THE EFFECT OF REPORTING BIAS ON THE OPIOID CRISIS: WHAT YOU DON'T KNOW CAN HURT YOU

AUTHORS: Katy Garmon[1], Kendall Hammonds[2], Emily Garmon[2] (1. Temple College, 2. Baylor Scott & White Medical Center)

ABSTRACT
Opioid overdose deaths began increasing after Oxycontin's release to the market. Because death investigation systems vary by state, there has historically been inconsistent reporting of the specific drug responsible for overdose deaths. Medical examiner (ME) systems are run by medical professionals and have plentiful resources. Coroner systems are run by elected officials. Law enforcement investigates deaths in states with neither of the other systems. It is unclear how current opioid overdose death statistics have changed over time and are affected by the investigation system. Here we show that overdoses with the drug specified significantly increased ($p<0.0001$) at a mean rate of 4% every 5 years between 1999 and 2022, and the rate of opioid-specific deaths also increased ($p<0.0001$), rising by 6% every five years. Centralized MEs reported higher rates of drug specified at the start of the study, but by 2022, all death investigation systems had similar reporting. Only systems using coroners or neither had significantly lower rates of opioid death reporting. Because of the variation in accurate death reporting between different systems, deaths attributable to opioids are likely still underrepresented. This diminishes the perceived harm caused by opioids and affects governmental appropriation of resources and public attention, both of which are necessary to curtail this epidemic. Nationwide implementation of a standardized medical examiner system for death investigations should be considered in order to improve accuracy of death reporting attributable to opioids and better represent the magnitude of this crisis.

P311 – EFFECTS OF LOCATION AND TIME OF HUNTING SEASON ON NASAL BOT FLY COUNTS IN WHITE-TAILED DEER

AUTHORS: Julia Galvan[1], Evee Rasor[1], Chad Cryer[1] (1. Temple College)

ABSTRACT

Botflies are of the genus Cephenemia and family Oestridae. Botflies are host dependent and live inside the nasal passageways and throat of deer, elk, and moose to host their offspring until the 3rd instar in their lifecycle, upon which time they leave through the nostrils or oral cavity. Some deer have been seen struggling to remove these larvae from their nose or throat, if this persists it can result in difficulty of breathing and in some cases deadly pathogenesis. In this study, we collected samples of bot fly larvae from deer heads dropped off for processing at Cryer taxidermy shop. We compared nasal bot fly larval loads in white-tailed deer to the location and date of the season the deer was killed. Our data shows how the location and date of the season of the host may affect the infestation of larvae in their nasal pathway.

P312 – LARGE-SCALE NATURAL AND ANTHROPOGENIC ENVIRONMENTAL VARIABLES ASSOCIATED WITH RIO GRANDE CHIRPING FROG DISTRIBUTION IN CENTRAL TEXAS

AUTHORS: Kamille Marry[1], Jeff R. Troy[1], Clark D. Jones[2] (1. Temple College, 2. Colorado State University-Pueblo)

ABSTRACT

The native range of the Rio Grande chirping frog (Eleutherodactylus cystignathoides) stretches from northeastern Mexico into the lower Rio Grande Valley region of Texas. However, human-mediated dispersal has resulted in the species spreading into Central, North, and East Texas, and into Louisiana. Despite this range expansion, large-scale environmental variables potentially associated with its distribution in these regions have not been investigated. In this study, we conducted auditory surveys for Rio Grande chirping frogs at random survey points (n = 103) along roadways in eastern Bell County, TX (east of IH-35) from April to May 2023 to determine confirmed presence and probable absence sites (survey points surrounded by 80-m circular buffers). We then tested for differences between these two site types in several large-scale natural and anthropogenic environmental variables we hypothesized might be associated with the distribution of this species in Central Texas using GIS-based variables. Our final averaged model suggests that percent urban imperviousness affects Rio Grande chirping frog distribution in our study region, with the probability of a site being suitable for frog presence initially increasing with percent imperviousness, peaking at 40-60% impervious cover (a range associated with low to medium intensity development, commonly including single-family housing units), and declining thereafter. Additionally, our results suggest there may be an additive positive effect of forest canopy height on the probability of site suitability for chirping frog presence, potentially linked to an increase in beneficial shade cover and leaf litter.

P313 – COMPLETING A FOSSIL OF A 99 MILLION YEAR OLD SQUAMATE FROM MYANMAR USING 3D MODELING

AUTHORS: Lilly Nguyen[1], Elizabeth Kull[1], Juan D. Daza[1] (1. Sam Houston State University)

ABSTRACT

Myanmar amber deposits include the most diverse squamate fauna in the world. There are approximately 120 reptiles preserved in amber, and only a handful of them have been formally described. Here, we provide a morphological description of a squamate in amber, previously identified as a basal squamate, and based on new material is likely to be a gecko. The new taxon is represented by two specimens. One specimen has several bones that are articulated and clustered together. The second specimen is articulated but is missing the posterior portion of the skull. Both of them have indications of a unique interlocking mechanism between the frontal and parietal bone. Using 3D rendering software, we created models of most of the bones from the skull, and tried to produce a mostly complete reconstruction of cranial morphology of this new taxon. Although amber from Myanmar is still controversial, in this project, we follow all of the recommendations for ethical sourcing established by the Society of Vertebrate Paleontology.

P314 – ENVIRONMENTAL FACTORS AFFECTING THE ANTIOXIDANT PROPERTIES AND PHENOLIC CONTENT OF GREEN AND PURPLE BASIL

AUTHORS: Myla Benally[1], Luke Ford[1], Andrea Armeriv[2], Teresa Bilinski[3], Emily Niemeyer[1] (1. Southwestern University, 2. St. Edward's University, 3. University of Colorado Boulder)

ABSTRACT

Basil (Ocimum basilicum L.) is a commonly known and widely used herb that produces high concentrations of phenolic compounds. In the human diet, phenolic compounds have antioxidant properties which provide health benefits against illnesses associated with oxidative stress such as heart disease and cancer. Plants such as basil synthesize phenolic compounds throughout their development due to a variety of environmental and agronomic factors, and the effects of soil bacteria and drought stress on the phenolic content and antioxidant properties of basil have not been extensively investigated. This study determined the individual and combined influence of Pseudomonas soil bacteria and drought stress on the concentration of phenolic compounds and resulting antioxidant capacities in green and purple basil. The total concentration of phenolic compounds within the basil samples was analyzed using the Folin-Ciocalteu assay and antioxidant properties were quantified using the cupric ion-reducing antioxidant capacity (CUPRAC) assay. The results of this research could enhance our understanding of the impact of environmental conditions on the production of phenolic compounds within basil and other herbaceous plants.

P316 – INVESTIGATING THE ANTIDEPRESSANT EFFECTS OF DIMETHYL FUMARATE IN A MURINE MODEL OF DIABETES

AUTHORS: Madilyn Johnson[1], Laura Kusumo[1], Reece Bonner[1], Kaylea Gawf[1], Elisabeth Vichaya[1] (1. Baylor University)

ABSTRACT

Individuals with diabetes have a twofold risk of developing depression. The mechanisms underlying this increased risk are not yet clear, however, emerging evidence indicates that oxidative stress may play a role. We sought to investigate this mechanism using a murine model of diabetes. As type 2 diabetes is most common, we combined high fat diet (HFD) feeding with chemical induction of hyperglycemia, using streptozotocin (STZ) to better model this condition. We investigated the antidepressant effects of dimethyl fumarate (DMF), which promotes cellular defense against oxidative stress through activation of NRF2. We used a 2 (STZ-HFD vs VEH-control) x 2 (+/-DMF) factorial design (n = 5-7 mice/group). Male C57BL/6J mice were randomly assigned and weaned onto HFD or control diet for the duration of the study. After 18 weeks, mice were treated with 50 mg/kg/day STZ for 5 days or equal volume citrate buffer. Two weeks after STZ treatment, we confirmed mice were hyperglycemic (blood glucose ? 250mg/dL) and started oral DMF treatment (80 mg/kg in 200µl of peanut butter) for 12 days. Behavioral testing began after 10 days of DMF treatment. In marble burying, STZ induced a decrease in marbles buried and DMF reversed this effect ($p < 0.0147$). We also observed that STZ-HFD reduced nest building ($p < 0.0001$) and grooming in the splash test ($p < 0.0182$) without a reversal by DMF. This suggests that DMF may attenuate some, but not all behavioral effects in this model of type 2 diabetes. Further brain tissue analyses are in progress.

P317 – CRANIAL ANATOMY OF THE AUSTRALIAN WESTERN BEAKED GECKO (RHYNCHOEDURA OMATA: DIPLODACTYLIDAE: GEKKOTA) IN 3D

AUTHORS: Andrew Rock[1], Samira Alam[1], Tanya Duran[1], Sofiane Gana[1], Elyse Howerton[1], Camilo Linares[1], Amber Reynolds[1], Elizabeth Saxton[1], Aaron Bauer[2], Juan D. Daza[1])

ABSTRACT

The Australian Western Beaked Gecko is a widespread small species in Australia, it is characterized by having shortened snout while retaining a large eye. In this project we made a bone by bone description of this species using computer tomography, and all the digital separation of bones was done in a graduate class at Sam Houston State University. We selected this species due to its distinctive morphology, but also because only a handful of diplodactylid geckos have been described , and none of them using a bone by bone approach. The premaxilla in this species is highly reduced while the prefrontal is proportionally larger when compared to the surrounding bones. The frontal bone has a distinct morphology with large recessed areas for the joints with the prefrontal, but also has some well developed lateral shelves that separates the prefrontal and postfrontal bones. The interparietal suture is not fused and has a keyhole notch posteriorly. The specimen selected is probably a sub adult and has allowed us to describe in detail every element of the basicranium. The sclera has an elevated number of ossicles (40) and they are more prominent on the dorsally than ventrally. This project allowed us to use the strategy of divide and conquer to accelerate the segmentation process. New versions of 3D software include AI tools that can make separating elements even faster.

P318 – EXPLORING EMOTIONAL DEVELOPMENT THROUGH PHYSIOLOGICAL, BEHAVIORAL, AND CONTEXTUAL FACTORS

AUTHORS: Nicole Jackson[1], Yelim Hong[1], Megan Klinginsmith[1], Laura Quiñones Camacho[1] (1. University of Texas at Austin)

ABSTRACT

Emotional development is influenced by physiological processes, patterns of behavior, and caregiver mental health with adaptive emotion regulation serving as a protective mechanism against mental health conditions like anxiety and depression. Respiratory Sinus Arrhythmia (RSA) measured via electrocardiogram is a measure of parasympathetic activation indicative of adaptive emotion regulation. Additionally, RSA synchronization between caregivers and their children predicts adaptive emotional development. According to attachment theory, physical affection is implicated in secure attachments and developmental outcomes. While these factors are well understood independently, the connection between physical affection and physiological synchronization in real-time has yet to be thoroughly investigated, especially within the context of an emotionally salient laboratory task and taking caregiver psychopathological symptoms into account. Data collection and behavioral coding are ongoing, and a small sample size limits our ability to identify significant findings or speculate about results at this stage. However, our study is one of the first to synchronize video, task markers, and ECG. This fully synchronized paradigm allows us to identify the tightness of physiological synchronization across the phases of an emotional task and in relation to instances of physical affection. We expect to find a positive correlation between physical affection and RSA synchronization, and for caregiver symptoms of anxiety and depression to moderate this relationship. Ultimately, this paradigm will allow us to directly examine the relationship between physiological, behavioral, and contextual factors that contribute to the risk of developing a mental health condition, and identify behaviors and caregiving practices that promote positive developmental outcomes.

P323 – INVESTIGATING CHLOROPLAST DNA DIVERSITY WITHIN POPULATIONS OF MENTZELIA THOMPSONII

AUTHORS: Gisela Guerrero[1], Darren Pratt[1], Nadia Tuggle[1], Kiley Frost[1], Kyuyeon Kim[1], Alexis Tuyo[1], Joshua Brokaw[1] (1. Abilene Christian University)

ABSTRACT

DNA research is potentially expensive, and we must balance the costs of data-intensive protocols with the resulting knowledge that may be produced. The classic Sanger method for DNA sequence analysis has a low cost for small study sizes, but it is inefficient and cost prohibitive for projects of massive scale. This small study seeks to determine whether populations of the inbreeding species Mentzelia thompsonii can be effectively characterized by a single Sanger sequence product from one individual. Such an approach allows the maximum number of separate populations to be sampled, but this would not be representative of the true genetic diversity if populations typically contain more than one DNA sequence type. Sampled specimens were collected from locations within the species' geographic range in the Colorado Plateau. Using tissue samples from collections preserved in silica-gel, we extracted 11 DNA samples in addition to those of previous researchers, from each of 5 populations representing a different haplotype, resulting in a total of 12 random plants sampled from each population. PCR using primers targeting the ndhF-rpl32 intergenic cpDNA spacer was performed, with successful products being sequenced by Sanger sequencing. These were compared to the ndhF-rpl32 haplotypes of previously sampled individuals from each population of Mentzelia thompsonii. Our findings support the hypothesis that the reproductive biology of Mentzelia thompsonii tends to reduce genetic diversity within populations. With few exceptions, most populations that we have sampled only contained a single haplotype. Populations in different parts of the species' geographic range may have different haplotypes.

P325 – TRAVEL OR TREAT?: AN ANALYSIS OF SPIDER AND HOWLER MONKEY PREHENSILE TAIL USE

AUTHORS: Lydia Lehman[1], Jill Pruetz[1] (1. Texas State University)

ABSTRACT

Recent literature has hypothesized that all prehensile-tailed Atelines are inclined to feeding-based tail use. This study investigates prehensile tail use in the mantled howler monkey (Alouatta palliata) and black-handed spider monkey (Ateles geoffroyi) in order to examine differences between these taxa in weight-bearing prehensile tail use behaviors. Observational data on the two

primate species' behaviors were collected at Camaquiri Conservation Initiative in Limón, Costa Rica, over the course of 7-days. A total of 14.4 hours of data were collected using focal sampling of 2-minute intervals across 20 minutes of observation time per subject. Results indicate that howler monkeys spent 23.91% of recorded movements engaging in weight-bearing tail postures and 34.88% of feeding engaged in weight-bearing postures of the tail. Spider monkeys spent 53.6% of their recorded weight-bearing tail postures for locomotor purposes and 28.78% for feeding purposes. Although the frequency of recorded general feeding or locomotor behaviors differed between the taxa, howler monkeys and spider monkeys displayed similar percentages of observed feeding behaviors in prehensile tail suspensory postures. This howler monkey data supports the assertions put forth by existing literature. However, the spider monkey data disagreed with this and instead supported a prehensile tail use preference for locomotion. The results of the current study demonstrate that similar habitat terrains and adaptations do not result in equal functional use. Future research should focus on investigating how seasonal nutritional resources influence prehensile tail use preferences.

P327 – UNDERSTANDING THE CORRELATION BETWEEN CARDIOVASCULAR DISEASE AND MAJOR DEPRESSIVE DISORDER: THE ROLE OF COMMON BIOMARKERS

AUTHORS: Kylee Adkinson[1], Macie Berry[1], Katherine Sanchez[2], Karel Kalecký[2] (1. Temple College, 2. Baylor Scott & White Research Institute)

ABSTRACT

Cardiovascular disease (CVD) is the leading cause of death in the U.S. While healthcare research has identified multiple physical and hereditary factors that impact CVD, there is growing recognition that mental health also plays a role. Specifically, major depressive disorder (MDD) is a leading cause of global disability and disease burden. In addition to its debilitating effects on mood and behavior, MDD is also directly linked to the excessive and premature development of CVD. Though research has shown this correlation, we remain unclear on exactly what biological processes lead to this increase in risk. In this research, we examined several biological markers that have a well-established link to CVD risk to determine if there was a correlation with symptoms of MDD. Here we show that there is no correlation with our chosen biomarkers (total cholesterol, LDL cholesterol, total triglycerides, and glucose) and PHQ-9 scores of ?10. In the current analysis, the previously identified correlation between MDD (or symptoms thereof) and CVD does not appear to be related to the chosen analytes. As we seek to understand the influence of mental health on CVD, research that concerns common factors such as the ones we evaluated will continue to be important. One variable that is not considered by the biological markers we chose is inflammation. Studies show that inflammation can be traced back to the prolonged release of stress hormones. Given that MDD is associated with chronic low-grade inflammatory response, it makes sense that there would be additional correlation with CVD.

P330 – INFLUENCE OF THE HYPORHEIC ZONE ON GENE FLOW IN INVERTEBRATES IN THE EDWARDS-TRINITY AQUIFER, TEXAS.

AUTHORS: Evan Guerrero[1], Kathryn Perez[1], Benjamin Hutchins[2], Benjamin Schwartz[2] (1. University of Texas Rio Grande Valley, 2. Texas State University)

ABSTRACT

There are 27 stygobitic (groundwater obligate) gastropod species described from the Edwards-Trinity Aquifer System in Texas, USA, with eight of these documented in hyporheic and/or aquifer habitats. The hyporheic zone is where groundwater and surface water mix in unconsolidated sediments beneath and adjacent to surface streams and rivers. In karst systems it is generally assumed that ranges of invertebrate species are <200 km, but several snails found in hyporheic and other groundwater habitats in Texas that have distributional ranges >200 km. We propose that snails (and likely other invertebrates) utilize hyporheic habitats as dispersal corridors. To test this hypothesis, we sampled stygobitic gastropods in two river systems that have different hydrogeologic conditions, including segments with and without hyporheic refugia. Our sampling to date includes sites in the Medina and San Marcos river systems both on and off the contributing and recharge zone for the Edwards Aquifer, where we have encountered Phreatodrobia micra and Phreatocerus taylori in large numbers. We will use genome skimming on five individuals per population for each stygobitic species encountered in these river systems and use that data to estimate population connectivity. We predict that occupancy of hyporheic habitats will enhance gene flow among the population sampled.

P335 – INITIAL CHARACTERIZATION OF UNIQUE MICE FIBROBLASTS POPULATIONS

AUTHORS: Megan Hicks[1], James Harper[1]) (1. Sam Houston State University)

ABSTRACT

Fibroblasts are the most utilized cell type for cell culture due to their high proliferative nature and simple growth requirements. Through repeated passaging, numerous cell lines have been established for use in biomedical research. Often a given cell line has unique physiologies to make some cell lines optimal for specific studies, as well as studying the influence of varied environmental factors on their growth and proliferation. In the case of fibroblasts, it is often assumed that they behave similarly in vitro regardless of source or time in culture. In this study, we have evaluated proliferation rate, oxidative stress resistance, and the wound healing response of spontaneously immortalized fibroblast cell lines (SHSUFA and SHSUFB) generated from the skin biopsies of mice of a mixed genetic background relative to an established fibroblast model (3T3). To date, our results have demonstrated marked differences in the biochemistry and physiology of our cell lines in relation to both each other and to 3T3 cells which highlights the importance of characterizing each new fibroblast cell line for subsequent studies. This approach has the potential to uncover novel traits among individual cell lines that make them best suited for specific lines of research.

P338 – MITOCHONDRIAL STRUCTURE IS ALTERED BEFORE MUSCLE WASTING DURING TUMOR INDUCED CACHEXIA

AUTHORS: Kenia Grimaldo[1], Sofiane Gana[1], Mardelle Atkins[1] (1. Sam Houston State University)

ABSTRACT

Cachexia, a chronic muscle wasting disease that affects 80% of cancer patients, causes approximately 20% of cancer patient mortality. Cachexia is defined by rapid muscle loss, fat loss, metabolic dysfunction, anorexia and early satiety. Yet, the mechanisms driving cachexia initiation are poorly characterized. Mouse models have yielded insight into cachexia but remain unable to reveal the initiating steps. This challenge makes it imperative to develop new models to discover the events prior to muscle wasting (pre-cachexic muscle). We developed a model of tumor induced cachexia in Drosophila melanogaster larvae and discovered subcellular changes in pre-cachexic muscles. One such change is altered ATP5A localization in the muscle. ATP5A, a component of the ATP synthase, aids in mitochondrial oxidative phosphorylation to generate ATP. We mined a previously published transcriptome and found that bellwether, a gene encoding ATP-5A, is downregulated in cachexic muscles in a similar model. Broadly, ATP5A antibody staining is used as a proxy for mitochondrial morphology. However, the transcriptional downregulation we observed in the published data called into question if this was an appropriate interpretation in our model. This led us to use other mitochondrial dyes to assess if the mitochondrial morphology is accurately represented by ATP5A. Using streptavidin, MitoLite, and mito-GFP, we observed changes in dye retention or localization that suggest disruptions to mitochondrial function. Of note, we find that mitochondrial changes begin significantly before other structural or functional phenotypes suggesting that mitochondrial dysfunction is an early feature in the onset of cachexia.

P339 – EARLY LIFE STRESS IN FMR1 KNOCKOUT MICE REDUCES BODY WEIGHT ACUTELY, BUT MINIMALLY ALTERS THE BEHAVIORAL MANIFESTATION

AUTHORS: Katherine Blandin[1], Taylor Bradish[1], David Narvaiz[1], Joshua Thayil[1], Chloe Lau[1], Diuto Enyeribe[1], Maria Hemmerseier[1] Kendall Lally[1], Joaquin Lugo[1], Leighton Douglas[1], Linay Burge[1] (1. Baylor University)

ABSTRACT

Fragile X syndrome (FXS) is the most prevalent inherited cause of intellectual disability and is marked by a mutation in the FMR1 gene, leading to disruptions in synaptic plasticity, neuronal connectivity, and neurotransmitter regulation. These disruptions underlie many of the observable behavioral deficits associated with the syndrome. Research suggests that chronic stress prenatally and during adulthood exacerbates cognitive and behavioral deficits observed in Fmr1 knockout (KO) mice. The long-term effects of chronic early life stress within the murine model remain undefined. Studying the interplay of genetic vulnerability and environmental stress, like chronic stress in Fmr1 KO mice, offers key insights into FXS mechanisms, guiding the development of innovative treatments. Preliminary results reveal that chronic stress significantly decreases short-term body weight in both genotypes (P<.001) at PD10. Within only stress-exposed adult behavior data currently collected with n=6 per genotype, there is no significant difference in locomotor activity, repetitive/restrictive behavior, or anxiety-like behavior. Here we show that acutely,

chronic ES decreased body weight. Fmr1 KO mice expressed increased activity and decreased anxiety-like behavior. Regardless of genotype, chronic ES decreased anxiety-like behavior. Our results suggest that though there are physical consequences of chronic early-life stress, behavior is minimally affected by environmental changes in our genetic KO model. Early critical periods of development are crucial, though within FXS, sensitivity in this period may not be potentiated by exposure to chronic stress in a genetic KO model based on behavioral profile.

P341 – VARIATIONS IN ANTIOXIDANT PROPERTIES AND PHENOLIC CONTENT WITHIN CULTIVARS OF MONARDA HERBS

AUTHORS: Mattigan Aga[1], Alexis Flores[1], Holly Lawson[2], Emily Niemeyer[1] (1. Southwestern University, 2. University of Michigan)

ABSTRACT

Lamiaceae herbs such as basil, thyme, oregano, and mint are widely studied and highly valued for their culinary uses as well as their medicinal properties. Plants of the Lamiaceae family contain phenolic compounds, substances with strong antioxidant capacities that confer health benefits within the human diet. Although plants of Monarda, a Lamiaceae genus, found widespread use in traditional medicine, little is known about their phenolic content and antioxidant properties compared to more common Lamiaceae herbs. In this study, five Monarda cultivars were grown from seed, their leaves were processed and dried, and the phenolic compounds were extracted. The total phenolic content of each cultivar was analyzed using the Folin-Ciocalteu assay and antioxidant properties were determined using the 2,2-diphenyl-1-picrylhydrazyl (DPPH) microplate assay. DPPH is a meta-stable free radical, so observed changes in its absorbance correspond to the free-radical scavenging capability and antioxidant strength of each Monarda cultivar sample. This presentation will demonstrate how the concentrations of phenolic compounds contribute to the antioxidant capacities of these Monarda cultivars, as well as how the strong antioxidant properties of Monarda plants may provide new herbal-medicinal applications.

P342 – EXPLORING THE PHENOLIC COMPOSITION OF MONARDA HERBS: INFLUENCE OF SEED SOURCE AND CULTIVAR

AUTHORS: Alexis Flores[1], Mattigan Aga[1], Holly Lawson[2], Emily Niemeyer[1] (1. Southwestern University, 2. University of Michigan)

ABSTRACT

The Lamiaceae or mint family is composed of around 7,000 species and contains a variety of aromatic plants. Characterized by their whorled leaves, square stems, and fragrant flowers, Lamiaceae plants are widely valued for their uses in holistic medicine, the production of essential oils, and as culinary ingredients. Previous research has investigated the phenolic content and antioxidant properties of more well-known Lamiaceae herbs such as sage, mint, rosemary, and basil. Yet very few studies have examined the chemical composition or antioxidant levels within Monarda plants, a genus within the Lamiaceae family of herbs also commonly known as bee balms. In this study, five Monarda cultivars were grown from seeds obtained from different commercial sources, the leaves were dried, and then the chemical components were extracted. Total phenolic contents were measured using the Folin-Ciocalteu assay and high-performance liquid chromatography (HPLC) was performed to determine concentrations of individual phenolic compounds within the Monarda samples. This presentation will discuss how cultivar and seed source affect the identities and concentrations of phenolic compounds within Monarda herbs.

P343 – STUDYING THE EFFECTIVENESS OF CHLORINE TREATMENT IN WASTEWATER USING MICROBIAL BIOFILM

AUTHORS: Philip Baker[1], Cephus Bess-Grunewald[1], Olabisi Ogunlewe[1], Bidisha Sengupta[1] (1. Stephen F. Austin State University)

ABSTRACT

Wastewater treatment is vital for public health, ensuring efficient reuse before releasing water into the environment. This process provides a reliable water source for homes, industries, and environment. Chlorine, a commonly used disinfectant in wastewater treatment, effectively eliminates pathogens and supports sustainable water management. However, treated wastewater may not

be entirely pure, as biofilms can still form in chlorine-treated wastewater. Biofilms are communities of microbial cells that adhere to surfaces by excreting DNA, protein, and polysaccharides. This study utilizes microbial biofilms to assess chlorine's effectiveness in wastewater treatment plants. Samples were collected from San Augustine, San Jacinto, and Nacogdoches wastewater treatment plants, along with sterilized distilled water and tap water collected in the laboratory. Bacillus thuringiensis (Bt) solution at an optical density (OD) of 0.03 was grown in Luria broth mixed with each water sample in a 50%:50% (v/v) for biofilm formation in a 24-well plate, incubated at 37?C for 24 hours. After incubation, optical spectroscopy, ion chromatography, and imaging studies were conducted to analyze biofilm formation. The OD of the supernatant revealed bacterial growth correlating to the amount of biofilm formed. Brightfield images showed bacteria aggregates confirming biofilm formation while scanning electron microscopy revealed the biofilm's surface structure, and ion chromatography indicated that chloride excretions correlated with biofilm growth.

P344 – IDENTIFICATION OF AFFIBODY MOLECULES THAT TARGET PHOSPHOLIPASE A2

AUTHORS: Kechcheng Sreang[1], Grace Youngblood[1], Edith Osborne[1], Kelyia Estell[1] (1. Angelo State University)

ABSTRACT

Despite the high rate of fatality due to snake bites every year, the availability of medicines, such as antivenoms, are somewhat limited. Phospholipases A2 (PLA2s) are one of the main toxin families found in snake venoms. They show a broad range of biological activities such as neurotoxicity, cardiotoxicity, hemolysis, modulation of the hemostatic system and inflammation. Because of their variety of biochemical and pharmacological effects, the study of PLA2 is significant in developing treatment for snakebites and other inflammatory diseases. The proposed research project aims to identify affibody molecules that target Phospholipase A2. Identified affibodies could aid future researchers as they investigate the biological function of PLA2s. It could also be a useful tool for purification of PLA2s using affinity chromatography and labeling the toxin and characterizing its cellular activity. For the first step of the research, we will select the affibody molecules by panning an affibody phage display library against PLA2. After identifying a promising affibody, we will sequence the affibody and clone it into an expression vector. Finally, we will express and purify the affibody protein so that it can used for further testing.

P347 – THE CONSEQUENCES ON NEUROINFLAMMATION FOLLOWING NEONATAL STATUS EPILEPTICUS IN C57BL/6J MICE

AUTHORS: Joshua Thayil[1], Taylor Bradish[1], David Narvaiz[2], Katherine Blandin[1], Reagan Yarborough[1], Danielle Santana-Coelho[2], Joaquin Lugo[1] (1. Baylor University, 2. University of Texas San Antonio)

ABSTRACT

Epilepsy is a chronic, neurological disorder associated with abnormal electrical activity in the brain, resulting in seizures. Epilepsy is prevalent during childhood and increases the risk of developing a range of cognitive and behavioral comorbidities throughout development. Following the occurrence of one or more seizures, cytokines and neuroinflammatory molecules are released into many brain regions which increases neuronal excitability and subsequently the likelihood of additional seizures. However, the neural mechanisms underlying the behavioral comorbidities later in life are not well understood. The present study examined the role of PI3K/Akt/mTOR pathway activity and neuroinflammatory signaling in the development of autistic-like behavior following seizures in the neonatal period. We did not find that status epilepticus (SE) increased levels of the three cytokines IL-1?, IL-6, or TNF? in the hippocampus. However, we did observe that the dual treatment of minocycline with rapamycin in the mice with kainic acid induced seizures resulted in a significant increase in IL-1? when compared to the saline control, saline with dual treatment, kainic acid group, kainic acid with rapamycin treatment, and the kainic acid with minocycline group. Additionally, we found no differences in IL-6. We did find that mice that received kainic acid with minocycline had elevated levels of TNF? compared to the saline with dual treatment and the saline with rapamycin. Our results demonstrate that dual treatment of rapamycin with minocycline increases proinflammatory cytokines in the hippocampus of mice with seizures.

P348 – THE OBSERVATIONAL ANALYSIS OF THE BEHAVIORAL DIFFERENCES BETWEEN PALAEMONETES PALUDOSUS AND POMACEA BRIDGESII

AUTHORS: Kirstey Ferguson[1], Laura Weiser Erlandson[1] (1. Texas A&M University)

ABSTRACT

The relationship between predator and prey is an ecological relationship where the predator hunt and kill the prey. One predator (Palaemonetes paludosus) and one prey (Pomacea bridgesii) species, (ghost shrimp and mystery snails respectively) were observed to document their interactions at different densities. Although they are documented to be docile, I hypothesize that P. paludosus will prey upon P. bridgesii. Six 1-gallon tanks were set up with four different predator/prey combinations (only shrimp, only snails, two shrimp and two snails, and five shrimp and two snails). This experiment was performed twice, once with supplementary food and once without. Results between trials were contradictory. With supplemental food, shrimp fed upon snails over the algal food. The shrimp also became territorial and killed each other over the snails. The results from the second trial showed that the shrimp avoided eating the snails and died, then the snails would eat the shrimp corpses. Given their natural resources, the shrimp prefer to eat the snails that are more nutritious when they have a choice and become the predator, however when not given the choice they would rather die and become the prey for the snails. This suggests that the ecological relationship between predator and prey can be interchangeable when presented with different conditions to adapt to the environment.

P350 – ANALYSIS AND VALIDATION OF QUANTITATIVE TRAIT LOCUS MAPPING OF LOCOMOTIVE BEHAVIORS IN DROSOPHILA SPECIES

AUTHORS: Pedro Rodriguez Navarro[1], Yuan Yuan Kang[1] (1. University of Houston Downtown)

ABSTRACT

Natural populations of different Drosophila species display different levels of locomotive behaviors driven by evolutionary changes in their genetic makeup. In our lab, we conducted Quantitative Trait Loci (QTL) mapping of two sister Drosophila species (sechellia and simulans) of their circadian-controlled 24-hour locomotive activity. Among the four phenotypes of their 24-hour locomotion profile, we uncovered a list of candidate genes that might affect the morning or evening anticipation. Several of these genes with high LOD scores were found to have homologs in Drosophila melanogaster, either previously identified to be important for other behaviors, or during development, or expressed in neurons but with no characterized function. To further validate the roles of these genes, we acquired the mutant and RNA interference lines of the Drosophila homologous genes and tested whether targeted knockdown of these candidate genes would lead to changes in their morning and evening anticipation.

P351 – FISH DIVERSITY IN ROATÁN, HONDURAS

AUTHORS: Emily Boling[1], Morena Flores Mejia[1], Rebecca Musick[1], Lorelei Payne[1], Anne Mowry[1], Traesha Robertson[2], Jacqueline Dove[1], Stephanie Lockwood[3], Stephanie Randell[1] (1. McLennan Community College, 2. College of Coastal Georgia, 3. Texas Tech University)

ABSTRACT

The health of coral reef ecosystems is linked to the balance between herbivorous and carnivorous fish species. Carnivorous fish regulate herbivorous fish populations, while herbivorous fish manage competition between algae and coral. Climate change has led to a decline in biodiversity among fish populations inhabiting coral reefs. This study, conducted in Roatán, Honduras, continues a 2023 investigation aimed at assessing and comparing fish diversity across multiple sites, utilizing the Shannon-Weaver Diversity Index. Data was collected from May 12 to May 17, 2024, using the roving diver technique (RDT) at five sites subjected to boat traffic and pollution along the northwestern coastline of the island. The researchers identified terminal and juvenile populations of various fish species in both shallow and deeper environments. Findings indicated slight deviations from the 2023 results: Bear's Den exhibited the highest diversity index (H=2.704) among the five dive sites in 2023; however, in 2024, its diversity index decreased (H=2.530), falling below expectations. In contrast, Fish Den and Mandy's Eel Garden demonstrated significant improvements in species richness and total diversity. A new site, My Choice, achieved the highest diversity index (H=3.09), while Fish Den remained at the lower end (H=2.58). All four dive sites reported diversity indices exceeding 1.5, surpassing the standard threshold for biodiversity. In 2023, Sergeant Majors, Blue Tangs, and Slippery Dicks were the predominant species; however, in 2024, Blue Chromis replaced Slippery Dicks. Observations indicated a higher abundance of juvenile fish in deeper habitats. Future studies should survey seagrass beds and mangrove forests.

P352 – THE NEED TO FEED: INVESTIGATING FEEDING PRACTICES FOR ZEBRA MUSSELS IN LABORATORY

RESEARCH

AUTHORS: Amya McCarroll[1], Cadence Sen[1], Chase Herrington[1], Jason Locklin[1] (1. Temple College)

ABSTRACT

The population dynamics and ecological impacts of zebra mussels (Dreissena polymorpha) in northern latitudes of Europe and North America have been well-studied. However, their relatively recent establishment in southern U.S. waterbodies has spurred further research into their ecology, physiology, and control in low-latitude systems due to their faster growth rates, semiannual spawning events, and boom-and-bust population dynamics. To perform reliable studies in the lab on these low-latitude populations where various factors can be appropriately controlled, efficient methods of maintaining mussels (i.e. the need to feed) during laboratory testing are essential. In this study, we evaluated the time to zebra mussel death in aquaria when food is present and absent to determine the necessity of feeding during laboratory testing and/or culturing. Mussels were collected in June and September of 2023 and 2024 from Stillhouse Hollow Lake. Following a two-week acclimation period in the lab, all mussels were placed in aquaria with consistent 30°C water temperatures (29.9±0.09°C) with aeration (DO 7.13±0.23 mg/L) and a 14/10 hour light-dark cycle. One cohort of mussels were fed dried algae (Chlorella sp.) every 3-d and the other cohort remained unfed through the study. Mortality checks occurred every 12-h. Regardless of when mussels were collected from the lake, there were no differences in mortality between fed and unfed mussel. Mussels may not have been fed sufficiently to detect a difference or feeding during laboratory testing may simply be unnecessary. Future studies will adjust feeding frequencies to evaluate whether feeding influences survival outcomes in zebra mussel laboratory research.

P354 – DISCOVERING NOVEL INHIBITORS FOR 6-PHOSPHOGLUCONATE DEHYDROGENASE IN PLASMODIUM VIVAX

AUTHORS: Celeste Rodriguez[1], Ifeanyichukw Nwofor[1], Josh T. Beckham[1] (1. University of Texas at Austin)

ABSTRACT

Malaria, an infectious disease considered a severe public health issue worldwide, is responsible for over 600,000 deaths annually. Plasmodium vivax is one of the five protozoa responsible for malarial infections and has developed resistance to chloroquine and sulfadoxine-pyrimethamine, two medications commonly utilized in malaria treatment. The protein 6-phosphogluconate dehydrogenase (6PGDH), involved in the pentose phosphate pathway (PPP), produces a precursor for ribose-5-phosphate, a component of nucleotides. The essential role of the enzyme makes 6PGDH an attractive target for small molecule drug discovery. This project aims to identify potential novel inhibitors of Pv6PGDH through virtual drug screening and binding assays with high ranking ligands. A homology model was created with the Pv6PGDH amino acid sequence and Plasmodium falciparum 6PGDH crystal structure. The molecular docking softwares GOLD and ICM were validated for their ability to predict binders for this target with positive and negative control ligands, then used to screen over 115,000 ligands. The highest ranking ligands were ordered for testing through biochemical assays. Plasmid containing the target protein was transformed into BL21 Escherichia coli cells, expressed via autoinduction, purified via nickel-affinity, characterized with SDS-PAGE, and analyzed through differential scanning fluorimetry (DSF) with and without ligands. In future research, DSF will be continued with additional ligands, crystallography will be conducted, and site-directed mutagenesis will be performed to determine the binding ability of novel inhibitors to mutated forms of Pv6PGDH. The results of this work may contribute to new options in the field for treating this pervasive disease.

P357 – NEUROPLASTIC CHANGES IN OPIOID TOLERANCE: A COMPARATIVE STUDY OF OXYCODONE AND FENTANYL

AUTHORS: Arjun Trehan[1], Mariana Dejeux[1], Sarah Jewanee[1], Blake Reeves[1], Benjamin Schwartz[1], Jacques Nguyen[1] (1. Baylor University)

ABSTRACT

More than 9 million Americans ages 12 and older misused opioids in the past year, and more than 5.5 million live with opioid use disorder. This study aimed to investigate how tolerance and withdrawal behaviors differ between repeated exposure to oxycodone and fentanyl following periods of abstinence. Adult male Wistar rats were administered either single or repeated doses of oxycodone (2 or 4 mg/kg, i.p.) or fentanyl (0.004, 0.016, or 0.125 mg/kg, s.c.) over a seven-day period and fifteen-day period. Behavioral assessments included the tail-withdrawal test for nociceptive response and opioid withdrawal scoring. Results indicated that both drugs elicited tolerance to antinociceptive effects after repeated injections, with fentanyl displaying

significantly higher potency. While no significant differences (p = 0.05) in withdrawal-like behaviors were observed between the groups during the seven-day regimen, findings from both the seven- and fifteen-day exposure groups revealed a weakening tolerance effect in the tail-withdrawal test after abstinence periods. Preliminary findings also suggest neurobiological changes in response to repeated drug exposure, which may contribute to these observed changes in tolerance. Perineuronal net (PNN) expression increased after fentanyl injections in a duration-dependent manner, suggesting that opioid tolerance or sensitization may be mediated in part by PNN structure and function. These findings highlight that, despite differing potency, both oxycodone and fentanyl induce tolerance, and abstinence periods lead to varying tolerance effects over time, underscoring the importance of studying synthetic opioids under different exposure paradigms.

P358 – EFFECT OF ABIOTIC STRESSES ON CELLULAR RESPONSES IN PENIUM MARGARITACEUM

AUTHORS: Kassandra Orellana[1], Kattia Palacio-Lopez[1] (1. University of Houston-Downtown)

ABSTRACT

Penium margaritaceum, a desmid green alga closely related to land plants, serves as a fascinating model organism for studying how life adapts to environmental challenges. In this study, Penium was subjected to 21 unique conditions, including variations in salinity, hormones, herbicides, and inhibitors, to explore changes in key features to respond to and manage abiotic stress at the cellular level. For example, under high salinity, Penium may experience osmotic stress, triggering mechanisms like producing osmolytes or thickening its cell wall for protection. Similarly, when nutrients are scarce, Penium could adjust its chloroplast architecture therefore, its photosynthetic efficiency. The experimental conditions included exposure to compounds like NaCl, KCl, CaCl2, flufenacet, LY294, abscisic acid (ABA), and polyethylene glycol (PEG) at varying concentrations mixed with 500uL of growth media and 20uL of algae in each well on a 24 well plate. Cells were observed under fluorescent light microscopy at 24, 48, and 72 hours. We found major cell alterations including cell shape, chloroplast and cell wall structure. The findings provide valuable insights into the evolutionary strategies that enabled ancestral algae to overcome land colonization.

P360 – QUANTIFICATION OF INDIVIDUAL FLAVONOIDS AND METHYLXANTHINES IN CACAO NIBS SOURCED FROM DIFFERENT ORIGINS

AUTHORS: Alex Dow[1], Samantha Hazen[1], Holly Lawson[2], Emily Niemeyer[1] (1. Southwestern University, 2. University of Michigan)

ABSTRACT

Plants of the same species may exhibit varying chemical compositions when grown in different regions due to climate, soil type, or altitude. These environmental differences influence plant metabolism, leading to changes in the production of secondary metabolites such as phenolic compounds. Cacao nibs, produced from the beans of the Theobroma cacao tree, are grown in over 50 countries. They contain high levels of phenolic compounds, particularly flavonoids, a classification of phenolics with potent antioxidant properties that are characterized by their C6-C3-C6 structures. Although phenolic content varies in cacao nibs depending on the region in which they are grown, it is unclear how flavonoid levels or phenolic composition may be affected by environmental conditions. In this study, nib samples were obtained from 10 different countries, processed, and their phenolic compounds were extracted. The total phenolic content (TPC) and flavonoid concentrations were measured using colorimetric assays adapted for a microplate spectrophotometer. Cacao flavonoids and methylxanthines (i.e., theobromine and caffeine) were separated, identified, and quantified within the nib extracts using high-performance liquid chromatography (HPLC). Initial results show significant differences in TPC and total flavonoid levels between nibs from different countries. For example, nibs from cacao grown in Thailand and Peru generally had higher phenolic levels and flavonoid concentrations than those from other regions. This presentation will discuss variations in the antioxidant capacity, methylxanthine content, and flavonoid composition among nibs from different geographical origins, providing helpful information on the best place to grow cacao to optimize its antioxidative properties.

P361 – PROGENESIS AS AN EXPLANATION FOR THE SIMILARITY BETWEEN ADULT MINIATURIZED GECKOS AND JUVENILE LARGER GECKOS' HANDS

AUTHORS: Elyse Howerton[1], Juan D. Daza[1], Aaron Bauer[2] (1. Sam Houston State University, 2. Villanova University)

ABSTRACT
Progenesis is a process proposed as a mechanism for producing miniaturized species. This developmental pattern may result in the deletion of terminal stages during ontogeny, a phenomenon documented in salamanders of the genus Thorius. In this study, we examine the morphology of the manus in several sphaerodactylid species, including the world's smallest amniote. The manus of extremely miniaturized species resembles that of juvenile larger species, supporting the idea that progenesis occurs in miniaturized forms. In this project, we will survey manus morphology across a large sample of geckos to further investigate this developmental pattern.

P362 – ARGININE KINASE 1 IS NECESSARY FOR EYE DEVELOPMENT IN DROSOPHILA MELANOGASTER

AUTHORS: Amber Reynolds[1], Josceline Tenido[1], Kaycee Torres[1], Courtney Farrington[1], Mardelle Atkins[1] (1. Sam Houston State University)

ABSTRACT
Arginine Kinase 1 (ArgK1) in Drosophila, and its conserved ortholog Creatine Kinase (CK) in humans, are known to play a crucial role in maintaining free energy reserves in the brain, heart tissue, and muscles. These free energy reserves are generated by the interactions of the respective phosphagens arginine and creatine with ArgK1 and Creatine Kinase. While Arginine Kinase is typically found in invertebrates, Creatine Kinase is found in vertebrates. In a recent screen for genes involved in eye development, we identified that depletion of ArgK1 in the developing Drosophila eye causes significant defects in growth, patterning, a 10-15% incidence of transdetermination, and frequent left-right asymmetry. These findings suggest that ArgK1 is essential for normal eye development and the restriction of cell fate. The functional role of Arginine Kinase 1 in epithelial tissues remains unexplored. Here, we present an initial, in vivo analysis of ArgK1 expression during eye development, document phenotypic changes resulting from ArgK1 knockdown, and assess possible mechanisms underlying those phenotypes. This study aims to shed new light on the role of ArgK1 in development and the broader function of phosphagen systems in epithelial tissues.

P364 – AN AFFINITY ANALYSIS OF ALIIVIBRIO FISCHERI AND ZOOXANTHELLAE

AUTHORS: Murphy Jacobie[1], Stacie Brown[1] (1. Southwestern University)

ABSTRACT
Coral reefs are threatened on a global scale as ocean temperatures rise and ocean acidification becomes more widespread due to climate destabilization. There is a lot of research on the best ways to prevent corals from bleaching, but little research has been done to study how to help a coral recover after it bleaches. A gap in the research presents itself when it comes to attracting Zooxanthellae to bleached corals, as there is little to no research on this topic. Previous unpublished work suggests that Zooxanthellae is attracted to the bioluminescence of Aliivibrio fischeri, a bacterium commonly found in marine habitats. Our study hopes to expand on these findings, by studying the affinity between these two organisms. Our experiment involves a clear 50 ml conical containing bioluminescent A. fischeri, inside a beaker containing Zooxanthellae. We will quantify the data using a hemocytometer to count the number of Zooxanthellae for each treatment and use a Welches T-test for significant differences in populations. The findings from this research will expand our knowledge on how Zooxanthellae interact with V. fischeri, and with their environment, which will aid future coral conservation research.

P365 – ANALYSIS OF MICROPLASTIC CONCENTRATIONS IN DRIED ALGAE MATS AND SEDIMENT COLLECTED FROM DETENTION BASINS IN THE EDWARDS AQUIFER RECHARGE ZONE.

AUTHORS: Paulina Quinonez[1], Andre Felton[1], Jeffrey Hutchinson[1] (1. The University of Texas at San Antonio)

ABSTRACT
Microplastics (MP), defined as plastic particles between 1 µm and 5 mm, are pervasive pollutants detected in various environments, including oceans, rivers, lakes, and even atmospheric deposits in remote regions. Recently, efforts have focused on identifying and understanding MP transport dynamics (i.e. sources, vectors, sinks, etc.) within aquatic and terrestrial systems. Roadways and impervious surfaces have been known to be major sources of contamination through runoff. Detention basins potentially function as primary sinks, capturing MPs before they infiltrate groundwater resources. This research explores the role of algae mats and detention basins for bioretention sinks of MPs versus soil within urban areas over the Edwards Aquifer recharge

zone. Samples of algae and soil were collected and subjected to digestion, separation, and identification through Fourier transform infrared spectroscopy (FTIR) to quantify MP presence and type. By examining MP concentrations and polymer types, the research aims to trace potential point sources of MP pollution. Results are expected to provide insight into MP transport and accumulation in urban stormwater systems, contributing to improved strategies for MP management and mitigation within karst aquifer recharge zones.

P366 – THREADS OF CHANGE: ZOOPLANKTON COMMUNITY SHIFTS IN RESPONSE TO FIBER DISTURBANCES

AUTHORS: Caitlyn Lankford[1], Heaven Thompson[1], Ashton Fisher[1], Addison Lehew[1], Mary Kay Johnston[1] (1. Concordia University Texas)

ABSTRACT

Microfibers are small particles of synthetic or natural origin that are frequently released from textile products during activities such as washing, wearing, or manufacturing. Unlike most natural microfibers which are generally biodegradable, synthetic microfibers are often based in plastic materials like polyester (PE) or nylon which are not easily degraded by natural processes. This presents many potential risks toward aquatic microorganisms that might ingest or become entangled in these particles. Currently, most research suggests that microorganisms experience adverse effects in growth and reproduction when subjected to microfibers, however, it is still not fully understood how entire communities may respond to textile fibers, whether synthetic or natural. Here we present evidence of changes in zooplankton community composition within microcosms (300mL volume) following inoculation with synthetic or natural fibers. Shifts in community composition appear to be idiosyncratic, depending on taxon and source population. For instance, synthetic (PE) fibers decreased copepod abundance in communities derived from poor, low productivity habitats; however, cellulose fibers increased copepod abundance in communities derived from high productivity habitats. These results suggest that both microfiber type and source community, together, shapes zooplankton community structure. Furthermore, this possible connection calls for additional research to further investigate how coevolving communities may show differential responses to anthropogenic perturbations. By studying the effects of microfibers on ecosystems, we are better able to develop effective interventions for those effects.

P367 – HEMANGIOSARCOMA IN CANINES: A PERSONAL CASE STUDY IN DISEASE PROGRESSION AND THERAPY

AUTHORS: Yuto Goto[1] (1. McLennan Community College)

ABSTRACT

Hemangiosarcoma is an aggressive and malignant tumor originating from endothelial cells, which line blood vessels. Commonly diagnosed in dogs, this cancer is fast-growing and highly invasive, often affecting the spleen, heart, and, in some cases, the skin. Hemangiosarcoma is notorious for its rapid progression and high mortality rate due to its asymptomatic nature in its early stages. Symptoms, such as lethargy, pale gums, abdominal swelling, and sudden collapse, typically only appear after the tumor ruptures or metastasizes, leading to internal bleeding and, in many cases, sudden death. Treatment for hemangiosarcoma involves surgical tumor removal when feasible, followed by chemotherapy to slow metastasis. Despite these efforts, the prognosis remains poor, with limited survival time post-diagnosis. In this study, I will share a personal case study based on my golden retriever, who was diagnosed with hemangiosarcoma in April and passed away in August in Japan. The presentation will include his diagnostic timeline, treatment regimen—comprising spleen surgery, chemotherapy, thalidomide, Trametes robiniophila murr, and ultra-high-dose vitamin C infusion therapy—and blood test results. This case study aims to provide insights into hemangiosarcoma's progression, challenges in treatment, and ongoing research into potential new therapies.

P368 – MICROGRAVITY EXPERIMENT FOR LUNAR DUST (MELD): A PLATFORM TO STUDY LUNAR DUST INTERACTIONS WITH SURFACES

AUTHORS: Samantha Daigle[1], Karissa Coker[1], Jeffry Kelber[2], Eduardo Bidot[3], Matthew Wittal[3], Richard Zhang[2], John Beatty[1] (1. Texas Woman's University, 2. University of North Texas, 3. NASA)

ABSTRACT

Lunar regolith consists of particles ranging from fine dust to boulder-sized rocks. Its elemental composition varies but primarily consists of silicon (Si), iron (Fe), and titanium (Ti). Due to the lack of weathering processes on the Moon, the regolith features sharp, pointed edges, even in the smallest dust particles. Additionally, exposure to sunlight in a vacuum induces a static charge on the fine particles, creating additional dynamics such as lofting and adhesion not characteristic of its terrestrial counterparts. Dust plumes generated during lunar landings and surface activity have caused ablation to materials in the past and may propel particles to extremely high velocities. To mitigate this, protective and dust-repellent coatings are being developed for equipment sent to the Moon. In collaboration with the University of North Texas (UNT) and NASA, this project aims to develop and study coatings that repel lunar dust, manage heat dissipation in spacecraft, and protect equipment from the harmful effects of lunar dust. As part of this research, a vacuum chamber was constructed with a dust launcher (MELD system) to simulate lunar conditions and study the impact of lunar regolith simulant on a variety of surfaces and coatings. By analyzing the surfaces before and after dust impacts with Scanning Electron Microscopy (SEM) and FTIR microscopy, the adhesion and ablation of these materials were assessed, and the effectiveness of the dust cannon was quantified.

P371 – A STUDY OF THE DEFAULT MODE NETWORK IN INDIVIDUALS WITH ADHD

AUTHORS: Yuto Goto[1] (1. McLennan Community College)

ABSTRACT

This research investigates the relationship between Attention Deficit Hyperactivity Disorder (ADHD) and the Default Mode Network (DMN) in the brain. ADHD, a prevalent neurodevelopmental disorder, is characterized by symptoms of inattention, hyperactivity, and impulsivity. The DMN (Default Mode Network), a network of brain regions, activates when the mind is at rest and not engaged with the external world. This network is crucial for internal processes such as daydreaming and introspection. It has been hypothesized that the DMN functions differently in individuals with ADHD. The study reveals that those with ADHD show reduced connectivity (hypo-connectivity) in the DMN. This is in contrast to those without ADHD, who typically do not exhibit this reduced connectivity. The study highlights that this hypo-connectivity in the DMN among those with ADHD is associated with certain behavioral traits like increased mind-wandering, delay aversion, and a preference for immediate rewards. Individuals with ADHD often struggle to maintain a stable state in the DMN. This study seeks to deepen our understanding of the neurological basis of ADHD and explore how this new knowledge could lead to more effective treatments and management methods for the disorder.

P372 – RAD7-RAD16 IN GLOBAL GENOME NUCLEOTIDE EXCISION REPAIR IN SACCHAROMYCES CEREVISIAE

AUTHORS: Chathurika Hewa Bhashithage[1], Jung-Hyun Min[1] (1. Baylor University)

ABSTRACT

Nucleotide excision repair (NER) is a major cell DNA repair mechanism to remove structurally diverse bulky lesions. The inability to repair those lesions can impair cellular functions and lead to mutations and cancers. Global genome NER (GG-NER) removes damage from transcriptionally inactive DNA. In yeast, Rad7-Rad16 is indispensable for initiation and, together with Abf1, for excision steps of GG-NER. However, the detailed molecular mechanism of how Rad7-Rad16 (-Abf1) roles are linked in lesion recognition and excision remains unknown. Here, we show that Rad7-Rad16 has a higher lesion specificity than Rad4-Rad23, which is known as the lesion recognizer in yeast. Using an insect cell overexpression system, our lab successfully cloned and purified the Rad7-Rad16 complex and Abf1. Damage-specific DNA binding of the purified Rad7-Rad16 complex was quantified using competitive electrophoretic mobility shift assay (EMSA). The Cy5 end labeled 24 bp long mismatched and matched DNA was used as the substrates. Rad7-Rad16 showed 67±5 nM specific binding and 8268±394 nM non-specific binding, which indicates ~123 times more specific binding of Rad7-Rad16 to mismatched DNA. Our results demonstrate that Rad7-Rad16 has 25x higher lesion specificity than Rad4-Rad23 without ATP. The experiment is still underway to determine how ATP and Rad16's ATPase activity affects DNA binding. We will characterize the impact of Rad7-Rad16 on the recruitment of Rad4-Rad23 and lesion initiation. We will also characterize the interaction between Rad7-Rad16 and Abf1 and the effect on excision. Our studies will pave the way for the structural characterization of Rad7-Rad16 in NER using Cryo-EM.

P373 – PLANTS GROWN AT REDUCED PRESSURES FOR EXTRATERRESTRIAL ENVIRONMENTS

AUTHORS: Craig Bateman[1], John Beatty[1] (1. Texas Woman's University)

ABSTRACT

Cultivating crops in extraterrestrial environments, such as the lunar surface, requires developing adaptable agricultural practices and determining the optimal atmospheric conditions for growth in reduced pressures. Hydroponics, a soilless plant cultivation technique, shows promise for off-planet farming since lunar and Martian soils are unsuitable for traditional plant growth without extensive modification. Spinach, known for its rapid and well-documented growth cycle, serves as an ideal candidate for this study, providing insights into how partial pressures impact hydroponic growth. In this study, a modified chamber with a vacuum pump was used to create a reduced-pressure atmosphere for spinach germination. The apparatus was evaluated for pressure stability and water evaporation rates under these conditions. Four spinach strains were selected: Bloomsdale, New Zealand, Noble, and Viroflay. Seeds were planted in two growth mediums within the reduced-pressure chamber, maintaining a constant temperature and pressure between 9-10 psi (approximately two-thirds of normal atmospheric pressure) for two weeks to facilitate germination. A control group in a normal atmosphere was used to verify seed batch viability in standard seed trays. Successful germination was achieved for the New Zealand spinach strain within the reduced-pressure chamber, while the Viroflay, Noble, and New Zealand strains germinated in the control soil. This research offers valuable insights into optimizing hydroponic germination and growth of spinach under partial pressure conditions, advancing the potential for extraterrestrial crop cultivation.

P374 – SYNTHESIS AND CHARACTERIZATION OF COPPER (II) COMPLEXES WITH 1,10-PHENANTHROLINE-5,6-DIONE AND DERIVATIVE LIGANDS: POTENTIAL APPLICATIONS IN TRIPLE-NEGATIVE BREAST CANCER THERAPY

AUTHORS: Matthew Cartwright[1], Sofia Stanfield[1], Hadi Arman[2], Charles Fermaint[1], Rafael Adrian[1] (1. University of the Incarnate Word, 2. The University of Texas at San Antonio)

ABSTRACT

Copper(II) complexes have long attracted attention for their versatile chemical properties and potential applications from catalysis to medicine. Among these, complexes with 1,10-phenanthroline-5,6-dione and its derivatives are fascinating due to their promising biological activity and the potential for copper ions high redox activity. Such characteristics make them strong candidates for therapeutic applications, including treating challenging diseases like triple-negative breast cancer (TNBC). This study synthesized a series of copper(II) complexes using 1,10-phenanthroline-5,6-dione as the primary ligand, along with various phenanthroline derivatives, to investigate structural and biological properties. The complexes were characterized by Fourier-transform infrared spectroscopy to confirm ligand coordination through distinctive vibrational changes, mass spectrometry to verify the molecular integrity and composition of the synthesized complexes, and single crystal X-ray crystallography to confirm the molecular structure, while elemental analysis established the stoichiometry of the final products.

P377 – EFFECT OF RAPAMYCIN AND MINOCYCLINE ON AUTISTIC-LIKE BEHAVIORS IN MALE C57BL/6J MICE AFTER EARLY LIFE SEIZURE INDUCTION.

AUTHORS: Sydney Pell[1], Katherine Blandin[1], Taylor Bradish[1], Madison Wallis[1], Chloe Lau[1], Colton Kelley[1], Luke Hammett[1], Joshua Thayil[1], Ashley Smelley[1], Gautham Chelliah[1], David Narvaiz[1], Leighton Douglas[1] (1. Baylor University)

ABSTRACT

Epilepsy is a chronic neurological disorder characterized by abnormal electrical activity in the brain. It's prevalent during childhood and increases the risk of developing cognitive and behavioral comorbidities. Following one or more seizures, cytokines and neuroinflammatory molecules are released which increases excitability and the likelihood of additional seizures. However, the neural mechanisms underlying the behavioral comorbidities later in life are not well understood. Rapamycin, an inhibitor of mTOR protein kinase, and minocycline, an inhibitor of immune cell function, can reverses the epileptic phenotype. The present study examined the role of PI3K/Akt/mTOR pathway activity and neuroinflammation in the development of autistic-like behaviors following seizures in the neonatal period. Male C57BL/6J mice were administered saline or kainic acid to induce seizures on PD10. After 3 hours, the mice were administered either rapamycin, minocycline, both rapa/mino, or saline as a control. At adulthood the mice were run through behavioral testing. We found that rapamycin and minocycline treatment resulted in a reduction of

multiple measures of activity in the open field test in both insult and control groups. Treatment and insult did not affect motor behavior in elevated plus maze, but rapamycin treatment decreased the number of entries into closed arms compared to saline treatment in both groups. None of the treatments had a significant effect on repetitive behaviors. Treatment decreased freezing during the second intertrial interval in the fear conditioning paradigm. The data shows the clinical potential of mTOR and immune cell inhibitors for clinical use as its administration can reduce autistic-like behaviors.

P379 – CALCIUM ANALYSIS OF EGGSHELLS

AUTHORS: Kathryn Clevenger[1], Alyx Frantzen[1] (1. Stephen F. Austin State University)

ABSTRACT

The chemical content of eggshells is important for tracking the health of fowl, as the content of their eggshells reflects aspects of their diet, environment, and behaviors. Due to this, eggshells can serve as an indicator for environmental contaminants and the conditions in which the birds are found. Carbonic anhydrase plays a role in the development of eggshells and is affected by many environmental impacts, such as heavy metals. Calcium carbonate makes up a large portion of eggshells, yet heavy metals can replace calcium in eggshells, leading to deformations and contamination to the egg that can affect those consuming it. However, the analysis of calcium content in eggshells has proven difficult. A common instrument used to determine elemental composition is the ICP-MS; however, calcium is difficult to analyze. The argon used to generate the plasma interferes as it has a similar mass to calcium, which leads to artificially high and inconsistent calcium concentrations. A new method for isolating the calcium from eggshell is being developed to analyze the environmental impacts on chicken health. Oxalate is used to precipitate calcium oxalate from the eggshells. Gravimetric analysis is done using STA and IR. This will be done in addition to a full characterization using ICP-MS, XRD, and C-N analysis.

P382 – STUDIES OF THE TRANSITION METAL COMPLEX ON HUMAN SERUM ALBUMIN

AUTHORS: Tess Corbett[1], Nkeiruka Aziekwu[1], Perla Tovar[1], Bidisha Sengupta[1] (1. Stephen F. Austin State University)

ABSTRACT

Human serum albumin (HSA) is a vital plasma protein that maintains osmotic pressure and enhances ligand binding efficiency as a carrier for various substances, including hormones, fatty acids, and metal ions. The presence of multiple metal-binding sites within HSA facilitates the binding and interaction of metal ions without inducing major structural deformation. Transition metals which include iron (Fe), copper (Cu), zinc (Zn), and manganese (Mn) elements found in the d-block of the periodic table, can exert significant influence on the structure and function when interacting with HSA. This present study investigates the ligand binding and conformational changes induced by metal ions, particularly focusing on the tryptophan residue, a strong fluorophore located in the hydrophobic region of HSA. Optical spectroscopic (UV/Vis absorption, steady-state fluorescence, circular dichroism (CD)) techniques, were employed to carry out this investigation.CD-based concentration-dependent studies revealed that HSA self-associates and forms oligomers at concentrations exceeding 10 ?M in aqueous solution. Notably, significant conformational changes were observed in HSA structure with copper (Cu), compared to iron (Fe), at the same concentration. However, at concentration below 1mM Fe- HSA ligand binding interaction occurred without structural changes while Cu-HSA ligand binding interaction induced more pronounced structural changes. The versatility of HSA's interactions with metal presents opportunities which can be explored for designing therapeutic agents such as metal-based drugs. Future studies will explore the effects of other transition metals, such as silver and manganese on HSA's structural conformation.

P383 – THE EFFECTS OF VITAMIN D ON ZEBRAFISH IN VARIED PH ENVIRONMENTS

AUTHORS: Ethan Cortez[1] (1. Howard Payne University)

ABSTRACT

Danio rerio, also known as Zebrafish, are an effective model organism for research based on their external development, rapid growth, and similarity to humans in their genetic code. Environmental stressors are present throughout the natural world; however, little is known about the effects of Vitamin D on the acid-base regulation of Zebrafish. This study was designed to explore this relationship further. Three groups (one control, one with high Vitamin D levels, and one with low Vitamin D levels), were subjected to changes in pH in their respected environments. Factors such as growth change, survival rate, behavioral changes,

skin colorization, and changes in gill tissue were observed. Growth changes were measured though weight and length differences before and after the experiment. Observations were made of the behavioral changes and the skin colorization differences, as well as gill tissue changes between the groups. Although results are pending, it is hypothesized that vitamin D can help mitigate the negative effects that changes in the pH of the environment have on Zebrafish. This research aims to provide insight as to how Vitamin D can help stabilize acid-base equilibrium in Zebrafish as well as other similar organisms.

P385 – PRIMER DESIGN: DEVELOPING NEW TOOLS FOR DNA SEQUENCE INVESTIGATION IN THE PLANT GENUS MENTZELIA

AUTHORS: Kseniia Schneider[1], Amy Osborn[1], Joshua Brokaw[1] (1. Abilene Christian University)

ABSTRACT

Studies of population genetic processes in the genus Mentzelia have been limited due to the low genetic variation in DNA markers. Previous studies of species in Mentzelia section Trachyphytum have primarily used the ndhF–rpl32 cpDNA spacer to compare haplotypes. We have set out to develop methods for improved amplification and sequencing of additional noncoding cpDNA regions. This study focuses on the regions: atpI–atpH, trnQ–5'rps16, and psbJ–petA. Because previous attempts to amplify these regions have failed, we developed new PCR primers by searching full chloroplast genome sequences that have recently been made available for M. albicaulis and M. aspera and successfully tested PCR profiles for amplification and sequencing. When compared to ndhF–rpl32 cpDNA sequences of M. pectinata and M. thompsonii, all three of the newly developed markers exhibited slightly lower genetic variation, especially among populations of M. thompsonii. In descending order, greatest variation was recovered from atpI–atpH, followed by trnQ–5'rps16 and psbJ–petA. However, for comparisons only among populations of M. pectinata, all three new markers exhibited greater or equal variation with respect to ndhF–rpl32 and outperformed all previously sequenced cpDNA regions. Based on these findings, we plan to use the atpI–atpH intergenic spacer for future phylogeographic and population genetic studies of M. pectinata and close relatives.

P386 – NOVEL PALLADIUM(II)-POLYPHENOL COMPLEXES: SYNTHESIS, CHARACTERIZATION, AND ANTICANCER POTENTIAL AGAINST TRIPLE-NEGATIVE BREAST CANCER CELLS

AUTHORS: Victor Torres[1], Sofia Stanfield[1], Hadi Arman[2], Charles Fermaint[1], Rafael Adrian[1], (1. University of the Incarnate Word, 2. The University of Texas at San Antonio)

ABSTRACT

Palladium(II) complexes have shown potential therapeutic uses within medicinal chemistry, particularly in cancer treatment. These complexes are known for their ability to interact with biomolecules, modulate cellular processes, and exhibit cytotoxic effects on cancer cells. Here, we present the synthesis and characterization of novel palladium(II) complexes obtained by the reaction of palladium(II) phenanthroline chloride with polyphenol ligands, including gallic acid, vanillic acid, trans-ferulic acid, and caffeic acid. The synthesized complexes were characterized by infrared spectroscopy, >1>H-NMR spectroscopy, mass spectrometry, and single-crystal X-ray diffraction. The cytotoxicity of these novel complexes was explored using several triple-negative breast cancer cell lines, and these results will also be discussed.

P391 – GEOLOGIC SALT ANALYSIS

AUTHORS: Katelyn Jones[1], Alyx Frantzen[1], Julie Bloxson[1] (1. Stephen F. Austin State University)

ABSTRACT

Salt formations are a unique geological feature that represent a time of basin restriction and arid conditions, allowing for precipitation of minerals from saturation waters. They will also play a key role in energy transition, such as storage of hydrogen, CO_2, and natural gas liquids. Salt domes can also aid in geothermal exploration by acting as conduits for heat transfer to shallower depths. However, salt is often a collective term for evaporite minerals. Often salt domes or formations are comprised of halite (NaCl), calcite ($CaCO_3$, anhydrite ($CaSO_4$), and bittern salts (e.g. carnallite, sylvite, epsomite), which could affect their capacity for storage or heat transfer. “Salt” samples from across geologic time and around the globe are being characterized to better understand the composition. Due to their composition, salts are incredibly difficult to analyze, therefore require several techniques to properly characterize. Samples are analyzed using ICP-MS, IC, TGA, and XRD.

P392 – METABOLIC FINGERPRINTING OF CREEK ECOSYSTEMS: THE INFLUENCE OF URBAN STRESSORS ON PRODUCTIVITY AND RESPIRATION

AUTHORS: Ria Bhatia[1], Carol Tran[1], Isabella Serrao[1], Charles Yang[1], Joji Sherman[1], Irfan Eshan[1], Kandace Diaz[1] (1. University of Texas at Austin)

ABSTRACT

Metabolic regimes in urban creek ecosystems are influenced by urban stressors, leading to alterations of gross primary production (GPP) and ecosystem respiration (ER) compared to rural creeks. For example, high nutrient levels can increase GPP relative to ER, while flooding can reduce GPP. Understanding how urban stressors affect metabolic regimes can help evaluate their impact on creek ecosystems and guide management strategies. Metabolic fingerprinting allows us to visualize and compare annual metabolic regimes across creeks experiencing urban stressors. We hypothesize that metabolic fingerprints will: 1) reveal reduced productivity in creeks subject to frequent flooding, 2) be broader and skewed towards GPP in rural creeks with fewer stressors, and 3) be skewed towards ER in urban creeks with high nutrients and flooding. We measured daily GPP and ER in urban, rural, and managed creeks in Austin, TX, during 2019, 2020, and 2024. The managed creek, which prevents significant flooding, serves as a comparison to study urban stressors without flooding. Rural creeks had the broadest metabolic fingerprint, with the highest productivity and GPP/ER ratio. Urban creeks had broader fingerprints than managed creeks, but both were skewed towards respiration. Thus, urban stressors, even without flooding, can reduce productivity. Additionally, peak primary production shifted from spring to winter in urban creeks, indicating flooding may alter timing of high productivity. These findings underscore the complexity of stream responses to urban stressors and highlight the potential of metabolic fingerprints to inform conservation efforts, supporting data-driven strategies to mitigate urbanization impacts on creek ecosystems.

P397 – GENERALIZED HAPPY NUMBERS

AUTHORS: Briley Elrod[1], Rachel Lynn[1] (1. Schreiner University)

ABSTRACT

A happy number is defined as a positive integer that eventually reaches 1 when repeatedly replaced by the sum of the squares of its digits. For example, starting with 13: 1^2 + 3^2 = 10, 1^2 + 0^2 = 1, which means 13 is happy. Numbers that do not reach 1 and instead eventually fall into a repetitive cycle are called "unhappy." The work follows that of ''Generalized Happy Numbers" by Grundman and Teeple, and extends on the generalization written in that paper. We also show that for some certain bases, every number is a happy number, and for some other cases, we get unhappy numbers that have cycles with integers that sometimes get larger than a trillion. This study not only deepens our understanding of happy numbers as a unique subset of integers but also highlights their potential contributions to applied mathematics. Happy numbers could have potential applications to fields such as computer science and recreational mathematics.

P398 – FROM STORM DRAINS TO STREAMS: HOW RIPARIAN AND UPLAND LEAF INPUTS TRANSFORM URBAN CREEK ECOSYSTEMS

AUTHORS: Zoe Herndon[1], Mireya Velazquez[1], Alyssa Steinhart[1], Celeste Rodriguez[1], David Rimada[1], Pablo Ramos[1], Nardos Shiferaw[1] (1. University of Texas at Austin)

ABSTRACT

Terrestrial leaf litter from riparian species is a key energy source for small stream ecosystems, but in urban creeks, leaves from upland species could contribute substantial organic matter when transported through storm sewers during rainfall. Upland leaf litter, influenced by urban landscaping and soil moisture gradients, may differ in composition and nutrient quality from riparian litter. We hypothesize that upland species contribute significant organic matter to urban creeks, altering timing and quantity of nutrient availability. To estimate leaf biomass and species composition, we collected freshly fallen leaves in replicated quadrats from six riparian areas and along neighborhood roads near culverts in upland areas during fall 2022. After identifying and weighing the leaves, we measured leaf litter decomposition rates in a 13-week in-situ study. Upland species differed significantly from riparian species, with riparian leaves decomposing faster than upland leaves. Leaf biomass per square meter was similar in both habitats; however, because storm drains transport leaves from the entire watershed, upland leaf inputs more than doubled

riparian leaf litter inputs. The large biomass of novel species entering urban creeks increases total nutrient availability and timing of litter decomposition, which could alter food web dynamics, phenologies, and ecosystem respiration relative to primary production. The impact of upland plant litter on urban stream nutrient cycling could be mitigated by: 1) removing leaves from streets during the fall, or 2) planting native upland species with decomposition rates similar to riparian species.

P399 – EXPLORING THERMAL VARIABILITY IN URBAN CREEKS: THE COMBINED INFLUENCE OF UHI AND HYDROGEOLOGY

AUTHORS: Areli Velasquez[1], Alondra Trejo[1], Catherine Byelousova[1], Zachary Courreges[1], Kimberly Tran[1], Sommer Montes[1], Zenaida Rodriguez[1] (1. The University of Texas at Austin)

ABSTRACT

Altered thermal regimes in urban creeks, which affect aquatic ecosystems and water quality, are an important area of study, particularly in the context of urban heat islands (UHI). Urban environments, with increased impervious cover and reduced canopy, exacerbate heat retention, raising air and water temperatures. However, the effect of UHI on stream temperature patterns, especially in karst systems, is underexplored. Austin, Texas, located on the Balcones Fault Zone, has creeks fed by deep, confined aquifers to the west and shallow perched aquifers to the east. Additionally, up to 90% of stream flow in central Austin comes from municipal water via leaking pipes, altering base flow in dry seasons. This provides a unique opportunity to assess the combined influence of UHI and hydrogeology on creek thermal regimes. We hypothesize that urban creeks will experience higher nighttime temperatures, reduced seasonal variability, and more stable annual temperatures than rural creeks. We also expect western rural creeks, influenced by confined aquifers, to have lower overall temperatures and less variability than eastern creeks, which are fed by perched aquifers. In 2023, we deployed HOBO Tidbit temperature sensors in 20 creeks across an east-west gradient in Austin. Contrary to expectations, eastern urban creeks showed lower variability in warmer months but higher variability in cooler months. Urban creeks in the west had more temperature variability in cooler months. These findings highlight the complex interactions of UHI and hydrogeology, offering insights for watershed sustainability and thermal pollution mitigation strategies.

P400 – THE LIMITATIONS OF USING INTRAPERSONAL ISOTOPIC VARIATION WITHIN THE USE OF COMMINGLED BONES

AUTHORS: Tori Rowe[1], Stephanie Baker[1], Emma Giacomello[1] (1. Texas State University)

ABSTRACT

Collagen and bioapatite isotopes demonstrate an individual's dietary patterns, and these differences can provide insight into an individual's place of origin and geographic movements antemortem. This is accomplished by isotopic analysis, correlating nutritional patterns with the corresponding time and region's flora, fauna, and water sources. Isotopic compositions of ?13C and ?15N, along with bioapatite ?13C and ?18O levels, are typically sampled from an individual's long bones and tooth enamel. All values besides ?18O, have similar isotopic levels when the bones belong to the same person, enabling differentiation between individuals in commingled remains. To distinguish these individuals, thresholds for ?13C (1.35%), ?15N (0.95%) in collagen, and ?13C (1.90%) in bioapatite serve as guidelines. However, in this method limitations exist. Research indicates that isotopic composition near trauma or inflammation, sites can alter ?15N levels, potentially complicating isotopic distinction within intrapersonal bones. When distinguishing commingled bones practitioners should use caution when determining the sampling site. Moreover, in cases where mitochondrial DNA (mtDNA) is shared, distinguishing small, fragmented bones in commingled contexts remains challenging. Utilizing ?18O levels in bioapatite has limited diagnostic value due to weak intrapersonal correlations. Traditional analyses often integrate collagen and nitrogen isotopic data with grave goods to infer interpersonal relationships. I anticipate these limitations will be difficult to decipher using isotopic variation analysis in complex cases. Future work should examine the accuracy percentage when bioapatite strontium analysis is used in tandem with this. Establishing stronger correlations in structures would aid the study when other isotopic variations are affected.

P401 – PROPORTION OF DAILY COMMUNITY RESPIRATION IN TEXAS FARM PONDS FOR WHICH PLANKTON ARE RESPONSIBLE

AUTHORS: Sarah Baggett[1] (1. Baylor University)

ABSTRACT

Small ponds are plentiful and play a pivotal role in the ecosystem: they provide a habitat for many species, limit the flow of water and nutrients to the ocean, and process carbon, influencing carbon cycling dynamics on a global scale. Respiration is a key component of carbon cycling, since it involves the conversion of organic carbon to carbon dioxide. This study aims to ascertain the magnitude of the planktonic fraction of community respiration in three farm ponds located at a USDA field station in Riesel, Texas. Using the Staehr method, community respiration values were derived from dissolved oxygen changes measured by miniDOT sensors. Planktonic respiration was derived from dissolved oxygen changes in samples incubated at pond temperatures in dark biological oxygen demand (BOD) bottles. Samples were collected between fall 2019 and spring 2024. Ultimately, plankton contributed to less than 25% of community respiration, revealing the dominant effect of benthic communities on oxygen levels in these shallow water systems.

P402 – MECHANISM OF THE RAD34-RAD23-RAD33 IN RNA POLYMERASE I-ASSOCIATED TRANSCRIPTION-COUPLED NUCLEOTIDE EXCISION REPAIR OF YEAST

AUTHORS: Meenuka Dalpathadu[1], Linh Pham[2], Kenji Murakami[2], Jung-Hyun Min[1] (1. Baylor University, 2. University of Pennsylvania)

ABSTRACT

The nucleotide excision repair (NER) pathway is a conserved mechanism that maintains genome integrity by removing DNA helix-destabilizing lesions such as cyclobutane pyrimidine dimers and 6-4 photoproducts. A sub-pathway, the transcription-coupled NER(TC-NER), is initiated when a lesion stalls a transcribing RNA polymerase. In yeast, DNA damage removal in the transcribing strand (TS) of rRNA genes depends on Rad34, a homolog to Rad4, the yeast ortholog of human XPC, a known damage sensor and initiator of NER, upon the arrest of RNA Polymerase I. Even though studies have revealed that the TC-NER of the TS of rDNA is impaired in rad34? cells, the actual of Rad34 is not yet elucidated. To identify the potential of DNA damage identification in Rad34, an electrophoresis mobility shift assay was conducted. The Rad34-Rad23 complex showed a specific binding to the damaged DNA, and the dissociation constant was obtained as 330 nM±39. A crucial step that follows damage recognition is the recruitment of TFIIH to the damage site. To determine whether Rad34 can recruit TFIIH, an assembly involving damaged DNA and TFIIH was conducted. In the small-scale Cryo-EM sample assembly, Rad34 displayed a complex assembly with damaged DNA (AAF) and TFIIH (core and holo). For the structural characterization, the Rad34-Rad23-Rad33/Holo-TFIIH/AAF complex will be subjected to Cryo-EM structure generation, which will help in elucidating the role of Rad34-Rad23-Rad33 complex in RNAPI-associated TC-NER in yeast.

P404 – AUTOMATING FLASHCARD CREATION: A PYTHON-BASED APPROACH FOR ORGANIC CHEMISTRY EDUCATION

AUTHORS: Benjamin Rybak-Dow[1], Patrick Harlan[1], Connor Stear[1], Lance English[1] (1. Temple College)

ABSTRACT

Flashcards are a common study technique used across multiple education levels and subject areas. While often employed for rote memorization, they can also support higher-order chemistry tasks, such as learning the steps to draw Lewis structures or predicting products of complex organic reactions. Digital flashcards have enhanced this study method by reducing physical space requirements, enabling multi-sided cards, automating spaced repetition, and increasing accessibility to premade decks. However, studies suggest premade flashcards yield poorer outcomes than student-generated ones due to lost learning during card creation, variations in curriculum focus, or differences in content quality. To address the latter two challenges, we provided instructor-made digital flashcards to first-semester Organic Chemistry students. Usage was low, as many preferred paper flashcards or struggled with learning a new application. To bridge this gap, we developed a Python script to convert digital flashcards (in CSV format) into print-ready cards, which were produced in the college print shop and distributed during the Fall 2024 semester. Preliminary results suggest the flashcards are highly popular and improve exam performance and information retention. Additional flashcard decks will be created for other disciplines, including Organic Chemistry II, General Chemistry I, and Anatomy and Physiology, for the Spring 2025 semester. A formal study is planned for Fall 2025, including IRB approval and student surveys. This presentation will cover the Python script's design, the logistics of producing paper flashcards, and insights from student feedback, with the goal of enhancing study strategies across STEM disciplines.

P405 – DEVELOPMENT OF A PROTEIN STRUCTURE DRIVEN CURE MODULE FOR SECOND-SEMESTER ORGANIC CHEMISTRY

AUTHORS: Connor Stear[1], Cas Knox[2], Benjamin Rybak-Dow[1], Steven Whitten[2], Lance English[1] (1. Temple College, Temple, 2. Texas State University)

ABSTRACT

Course-based undergraduate research experiences (CUREs), where students engage in authentic research during standard lab periods, have gained popularity as an equitable means of expanding access to research. While enzymatic assay-based CUREs are common in chemistry and biochemistry labs, few focus on protein structure characterization. Since most Temple College chemistry students aspire to healthcare careers, there is an opportunity to develop biochemical research opportunities that integrate organic chemistry learning outcomes. This study aims to develop a protein structure-driven CURE for second-semester organic chemistry, leveraging a novel assay to assess the thermodynamics of intrinsically disordered protein region (IDR)-induced liquid-liquid phase separation (LLPS) under varying solution conditions. Proteomic analysis using ParSe identified several proteins undergoing LLPS under physiological conditions, including the zinc finger family protein ZNF-326. Preliminary results indicate ZNF-326 is an excellent model for a CURE. It expresses well, purifies via single-step nickel affinity chromatography, and remains remarkably stable, even without ultrapure water, retaining stability after several months at -20°C. This module bridges Organic Chemistry II and Biochemistry topics by connecting the chemistry of carboxylic acids and amines to biomolecules through hands-on protein characterization research. Initial implementation of the CURE module is planned for Spring 2025, offering many students their first authentic research experiences. Full implementation, including data collection on student learning outcomes, is scheduled for Fall 2025.

P406 – ESTABLISHMENT OF FISH TISSUE CULTURES TO ASSESS TOXICITY OF COPPER

AUTHORS: Tadeen Feroz[1], Olivia Donnelly[1], Taryn Pledger[1], Kaci Monk[1], Tyler Shannon[1], Scott Dyer[1] (1. LeTourneau University)

ABSTRACT

Due to animal welfare concerns, in vivo acute toxicity testing of fish is being scrutinized and discouraged. Sufficient studies have demonstrated the utility of fish tissue cultures replacing whole fish tests via the OECD Method 249: Fish Cell Line Acute Toxicity - The RTgill-W1 cell line assay. Prior to Fall 2024, LeTourneau University (LETU) had never cultured tissue cultures for the purpose of conducting toxicity tests. This presentation provides key details about the establishment of the culture of Rainbow Trout Gill (RTG-W1) cells, including technical hurdles that needed to be overcome. RTG-W1 cells were obtained from the American Type Culture Collection and cultured following the protocol outlined in OECD 249. Lebovitz-15 with 10% FBS and Gentamicin was the complete growth media. Cell attachment was best achieved in T-25 flasks and 96-well microtiter plates with Nunclon™ Supra Surface. The doubling rate was approximately 8-10 days at 20? . Bacterial contamination was minimized with 10 µg /mL Gentamicin. Neutral Red was used as a cytotoxicity indicator and showed that when cells were confluent and not exposed to a toxicant, the average NR absorbance at 540 nm ranged from 1.07 to 1.34. Toxicity results were based on total copper and showed RTG-W1 cells to be less sensitive than published in vivo studies. However, when copper's dissociation constant (Kd) was included in assessing bioavailability, similarities were observed.

P408 – USING GUIDED ANTIMICROBIAL PEPTIDES TO TARGET ONCOMICROBE F. NUCLEATUM AND PREVENT COLORECTAL CANCER PROGRESSION

AUTHORS: Allison Barton[1], Ankan Choudhury[1], Leigh Greathouse[1] (1. Baylor University)

ABSTRACT

Accounting for approximately 50,000 cancer deaths annually, colorectal cancer (CRC) is the second most lethal cancer in the U.S. A combination of chronic inflammation and somatic mutations are known to be strong drivers of CRC progression, with the gut microbiome steadily emerging as a mediating factor for inflammation. Native to the oral microbiome, Fusobacterium nucleatum (F. nucleatum) has been identified as a contributor to dysbiosis-related inflammation and CRC progression and metastasis. While F. nucleatum has been identified as an oncomicrobe, no therapies currently exist to target this bacterium without disrupting the

rest of the gut microbiome. Here, we attempt to use bioengineering probiotics expressing guided antimicrobial peptides to specifically inhibit F. nucleatum. We found that a Statherin-derived guide peptide significantly enhanced binding affinity to F. nucleatum, demonstrating preferential attachment when compared to control peptides. Using this Statherin-derived guide, we found that both guided (gAMPs) and unguided antimicrobial peptides (AMPs) inhibited F. nucleatum biofilm formation in vitro. The gAMPs simultaneously demonstrated reduced toxicity against non-target bacteria, Bacteroides fragilis and Escherichia coli. These results demonstrate the potential of engineered probiotics as a targeted approach to prevent and treat F. nucleatum presence in the gut microbiome. By binding specifically to the F. nucleatum membrane porin, FomA, the Statherin-guided antimicrobial peptides function in addressing pathogenic F. nucleatum while minimizing adverse effects on beneficial microbiota. Future clinical trials will explore the efficacy of this approach in CRC prevention and treatment.

P411 – ECOLOGICAL CONFLICTS INHERENT IN THE SPREAD AND MANAGEMENT OF A TEXAS INVASIVE, PAULOWNIA TOMENTOSA

AUTHORS: Richard Patrock[1] (1. Texas A&M University-Kingsville)

ABSTRACT

Pawlownia, or Empress trees are among the fastest growing vascular plants. It is this superpower that lends itself both to great human utility and ecological invasion, a classic conflict in economic biology. Native to China, they have been cultivated for over three millennia, largely for timber or as ornamentals. I recently came across an individual and subsequently found other records of its presence in the Coastal Bend of Texas and decided to explore its biology. Finding some easily available information on these trees confusing or otherwise deficient, I addressed three questions: 1) what are its global and local distribution patterns? 2) how easy is it to obtain propagation material in Texas, that is, how likely is it to be reintroduced; 3) What are its natural enemy communities in its new range and in its homeland; how many are shared? I compiled, filtered, and organized distribution and natural enemy community patterns from various biological databases and over 300 papers in older and recent literature. With respect to its distribution patterns, the invasive species literature did not account for many countries where the plant is established in cultivation. I organized the natural enemy community around plant part and age guilds and found records for viral, bacterial, fungal, plant and arthropod lineages. Plants of Chinese origin found in the United States shared as many as 22% of the Paulownia community, and as group shared 60% of its known natural community. I discuss some of the more interesting and recent findings.

P412 – ASSESSMENT OF FISH TISSUE CULTURES AS SUBSTITUTES FOR ANIMAL TESTS

AUTHORS: Taryn Pledger[1], Tadeen Feroz[1], Olivia Donnelly[1], Kaci Monk[1], Tyler Shannon[1], Scott Dyer[1] (1. LeTourneau University)

ABSTRACT

Environmental risk assessment of chemicals requires tests from three trophic levels: algae, invertebrates and fish. While testing whole organisms is environmentally relevant, they rarely involve obtaining data that can explain the potential mechanism of action. However, chemicals can be grouped based on their structural attributes and their relative toxicity to structural analogs via Quantitative Structure Activity Relationships (QSARs). In this study, we investigate the value of testing Rainbow Trout Gill cells (RTG-W1) against diverse chemicals. Three cytotoxicity endpoints were assessed: Lactate Dehydrogenase found in media, uptake of Neutral Red into lysosomes, and uptake of Alamar Blue into mitochondria. Each provides indicators of whether the potential site of action at the cellular level is at the plasma membrane or within the cell. Results from these assays were compared against published assessments as well as estimated toxicities from Ecosar, a USEPA modeling platform sponsored by the Office of Pollution Prevention and Toxics. Results showed that understanding bioavailability in the test media is critical for making appropriate comparisons as cytotoxicity endpoints are less sensitive than EC/L50 values from in vivo studies.

P413 – CHARACTERIZING THE ROLE OF DENND5B IN ZEBRAFISH THROUGH MICROINJECTION DURING EARLY EMBRYONIC DEVELOPMENT

AUTHORS: Isabella Simon[1], Magdalen Marston[1], Alicia Mendoza[1], Sharmin Hasan[1] (1. Sam Houston State University)

ABSTRACT

The WNT family of evolutionarily conserved signaling molecules plays a significant role in early embryonic development, influencing cell fate determination, cell proliferation, cell motility, and establishment of the primary axis. In the non-canonical WNT pathway, Daam1, the disheveled-associated activator of morphogenesis 1, plays an important role in gastrulation and neural tube closure in Xenopus. Previously, we found that Daam1 physically interacts with dennd5a, a small GTP-binding protein that plays a role in zebrafish (Danio rerio) embryogenesis. Due to the teleost's specific whole genome duplication event in zebrafish, a paralogue of dennd5a called dennd5b exists. This observation led us to hypothesize its paralogue, dennd5b, has a similar role in zebrafish embryogenesis, although its role in vertebrates remains largely unexplored. Here, we characterize the role of dennd5b during the early embryonic development of zebrafish. We performed knockdown studies on dennd5b using microinjection to deliver an ATG-blocking morpholino into the blastomeres of 1-2 cell stage fertilized zebrafish embryos, resulting in a compressed head and deformed tail phenotype in a dose-dependent manner, indicating an important role in embryonic morphogenesis. We are now performing a gain-off function by mRNA over-expression and loss-of-function via CRISPR-Cas-9 mediated gene knockout study to validate our knockdown data further and understand the function of dennd5b. Together with the overexpression, knockdown, and knockout analysis, this study will expand our understanding of the function of dennd5b during the early embryonic development of zebrafish.

P415 – IDENTIFYING NOVEL INHIBITORS OF 3-OXOACYL-(ACYL-CARRIER-PROTEIN) REDUCTASE IN PLASMODIUM FALCIPARUM TO COMBAT MALARIA

AUTHORS: Haneef Ibrahim[1], Josh T. Beckham[1], Walt Fast[1] (1. University of Texas at Austin)

ABSTRACT

Malaria is a widespread global disease caused by parasitic protozoans under the genus Plasmodium, with Plasmodium falciparum responsible for about 95% of both malaria cases and deaths worldwide. The growing resistance of P. falciparum to antimalarials coupled with significant global burdens of malaria necessitates more research on inhibitors of P. falciparum to counteract malaria. ?-ketoacyl-(acyl carrier protein) reductase, or PfFabG, is a key protein involved in the type II fatty acid biosynthesis (FASII) pathway necessary for P. falciparum cells to synthesize fatty acids for proliferation. Inhibition of PfFabG could potentially terminate P. falciparum communicability as PfFabG catalyzes a crucial reduction reaction of NADPH and ACP in the FASII pathway. For this project, in silico virtual drug screening methods are used to analyze potential ligand-enzyme interactions formed by novel small compounds that bind to and inhibit PfFabG. The GOLD (CCDC) software docks several configurations of different compounds into the X-ray crystal structure of the PfFabG apoenzyme (PDB ID: 2C07) and considers stereochemistry, bonds and other factors to calculate binding energies of each compound to predict binding ability. Top-scoring compounds are identified and tested in enzyme binding and inhibition assays with PfFabG enzymes expressed and purified from competent E. coli BL21(DE3) cells to verify the efficacy of top-hit ligands in both binding and inhibiting PfFabG. Discovery of novel small molecule inhibitors in P. falciparum using both virtual screening methods and biochemical assays allows for a less time consuming and more cost-effective drug discovery approach compared to traditional drug discovery research.

P416 – ROLE OF FNBP1 DURING EARLY DEVELOPMENT OF VERTEBRATE

AUTHORS: Ty Franklin[1], Sharmin Hasan[1] (1. Sam Houston State University)

ABSTRACT

In the non-canonical Wnt signaling pathway, a formin protein called Dishevelled associated activator of morphogenesis 1, Daam1, is required for vertebrate gastrulation and neural tube closure. However, it is still not fully understood how Daam1 establishes its role that makes cytoskeletal rearrangements an essential step during vertebrate gastrulation. In a screen for effector proteins of Daam1, the Fnbp1 protein was identified. Fnbp1 is highly conserved across species sharing over 90% sequence similarity between humans, frogs (Xenopus), and mice. In zebrafish (Danio rerio), there exist three human orthologues of fnbp1, fnbp1a, fnbp1b, and fnbp1 like (fnbp1L). However, the developmental expression and function of these novel genes are still unexplored in zebrafish. We are characterizing the expression and function of these three paralogues during the early embryonic development of zebrafish (Danio rerio). Our RT-PCR suggests that neither fnbp1a nor fnbp1b is expressed from 0 hours post fertilization (hpf) up to 24 hpf. The fnbp1-like paralogue, fnbp1L is expressed from 0 hpf until the gastrulation stage is complete suggesting it is the sole functional paralogue among the three during the early stages of embryogenesis. Its expression is no further detected at 24 hpf. To understand how fnbp1L functions, we are performing a gain-off function by mRNA over-expression and loss-of-function via knockdown analysis during the early embryonic development of zebrafish. Together with the knockdown and overexpression

analysis, our study will expand our understanding of how, when, and where fnbp1L is expressed and how it functions during early embryonic development.

P417 – MAKING DECISIONS: DOES MITOCHONDRIAL METABOLISM INFLUENCE RETINOGENESIS?

AUTHORS: Yaqueline Gutierrez[1], Yessenia Beltran[1], Emilia Santamaria[1], Elda Rueda[1] (1. University of Houston-Downtown)

ABSTRACT

The retina is the light-capturing tissue of the eye that allows us to see. Neurons and glial cells make up the adult-retina. During development, a pool of stem-like cells called the retinal progenitor cells (RPCs) give rise to neurons and glial cells. RPCs must make decisions to continue proliferating or exit the cell-cycle to enter retinogenesis. By the end of development about half of neurons in the inner retina need to die for the necessary neural connections to form. Thus, cell division, neurogenesis, and cell-death are spatiotemporally coordinated and tightly regulated to produce a specific ratio of the different cell types within the adult-retina. The molecular mechanisms that regulate such cell decisions are not completely understood. Metabolism is an essential factor for development. This is evident by congenital retinal disorders caused by mutations in metabolic enzymes. Metabolism is the set of cellular processes that convert nutrients into cellular energy. Most enzyme-mediated metabolism occurs in mitochondria. To investigate how metabolism interfaces with retinogenesis we disrupted the expression of the mitochondrial transcription factor A (TFAM) in the RPCs of mice. In the current study we are characterizing the consequences of Tfam loss in the developing retina.

P420 – INCREASING ETHANOL CONCENTRATIONS IN INCREMENTS CAN DETRIMENTALLY AFFECT YEAST CELL VIABILITY: MODELING ALCOHOL TOXICITY IN ANIMAL CELLS.

AUTHORS: Logan Olguin[1], Brennen Leidy[1] (1. Sam Houston State University)

ABSTRACT

Alcohol has been linked to an increased risk of liver disease, heart disease, and numerous cancers. Ethanol directly damages cells by causing oxidative stress, disrupting cell membranes, and damaging DNA. Although yeast naturally produces ethanol, it is still susceptible to ethanol toxicity at high concentrations, leading to mitochondrial damage, telomere shortening, and DNA degradation. In establishing the effects of ethanol toxicity on biological organisms, a complete correlation between yeast and animal cells remains undefined. This research demonstrates the effects of different concentrations of ethanol in yeast cells and how these results may be used to model alcohol toxicity in human cells. It was observed that viability assay and light absorbance values associated with yeast cells decreased at an ethanol concentration of ten percent, with cell membranes exhibiting loss of structural integrity (shape, rigidity). Initially, it was expected that the viability of yeast cells would begin to decline rapidly at fifteen percent, as demonstrated by previous research on the tolerance of yeast cells for alcohol production purposes. This data can be used to compare the ethanol tolerance of yeast cells to that of animal cells in order to better understand how alcohol intake affects humans. These results may permit the development of a baseline for further research into the effect of drinking habits on the cells of the human body and the collection of such data without requiring any exposure of animal subjects to alcohol.

P422 – THE SMALL MAMMAL FAUNA FROM MATJHABENG, A PLIOCENE FOSSIL LOCALITY IN THE FREE STATE OF SOUTH AFRICA.

AUTHORS: Brennen Leidy[1] (1. Sam Houston State University)

ABSTRACT

The Gauteng Province in the Free State of South Africa is known for its rich, fossiliferous geological deposits, yet localities of Plio-Pleistocene age remain relatively scarce outside this area. To consider the fossil hominins of Gauteng from an evolutionary perspective, however, the regional paleoenvironment must be understood. The Matjhabeng locality (~3.5 Ma), representing a temporal and geographical intermediate to those at Langebaanweg (~5.0 Ma) and Makapansgat (~2.5 Ma), is a position of great importance to the reconstruction of ancient southern Africa. Most notably, this site has produced an assemblage of small mammals, which serve to indicate environmental conditions. This study examines approximately 75 identifiable small mammal fossils, which were collected from a fossiliferous riverine deposit through three seasons of excavation in Matjhabeng. The resultant data indicates a wetland/grassland paleoenvironment, consistent with the reconstruction suggested by the

accompanying large mammal assemblage. Most specimens are either lagomorph or springhare molars, indistinguishable from modern forms. Currently, the springhares are assigned to the extant genus Pedetes, and the lagomorphs to the family Leporidae. Although neither taxon is associated with regional habitat, the presence of numerous isolated teeth is attributed to murine rodents, all of which are extant; these include a lower third molar of Gerbiliscus (naked-soled gerbils). Gerbils are common in present-day southern Africa, generally inhabiting arid/savanna environments. Other molars and incisors are assigned to the Otomyinae (groove-toothed rats); different taxa belonging to Otomyinae have been identified at Langebaanweg and Makapansgat, but unfortunately, the diagnostic dental characters are still present in extant forms.

P424 – EXPLAINING THE RELATIONSHIP BETWEEN ELEVATION AND GUT-MICROBE DIVERSITY OF SCELOPORUS POINSETTII (CREVICE SPINY LIZARD) BETWEEN THE CHRISTMAS AND DAVIS MOUNTAINS

AUTHORS: Thomas Levrie[1], Thornton Larson[1] (1. Sul Ross University)

ABSTRACT

We will be investigating the effects between populations on gut microbe diversity of Sceloporus poinsettii, between the Christmas Mountains (~914m to 1,737m) and the Davis Mountains (~1,524m to 2,560m) of West Texas. The Davis Mountains are commonly referred to as a “Sky Island” —a mountain range surrounded by West Texas desert, the cool temperatures and moderate rainfall make it an ideal habitat for a range of species. However, the Christmas Mountains are arid, hot, and though they receive almost as much rainfall as the Davis Mountains, evapotranspiration is much higher. The objectives of this project are (1) to analyze gut-bacteria of S. poinsetii in different habitat types, (2) to observe whether diet, habitat or both influence gut-microbial diversity, and (3) further identifying their key habitat features to better understand optimum habitat conditions. Diet has been looked at in some populations of S. poinsettii, but the microbial diversity based on diet and habitat are poorly understood. By analyzing gut microbiota, I hope to gather insight on how S. poinsettii persists in varying conditions. In this study, I will amplify the V4 region of the 16s rRNA bacterial gene via 16s amplicon sequencing. This will help identify highly conserved segments of bacterial DNA and will be compared with existing databases to help identify said bacteria. I expect to see significant differences in gut microbial composition as a result of habitat differences. This research will assist future studies to better understand how gut microbiota is affected by West Texas ecosystems.

ORAL ABSTRACTS

(by ID number)

ID 12 - PYTHON-BASED MACHINE LEARNING FOR THREE-DIMENSIONAL HUMAN BRAIN MODEL SEGMENTATION AND ANALYSIS

AUTHORS: Morgan Smith[1]; Elizabeth Ochoa[2]; Kevin Bieniek[2] (1. University of Houston, 2. University of Texas Health Science Center at San Antonio)

ABSTRACT

Neurodegenerative diseases, such as Alzheimer's disease, cause atrophy of specific regions of the brain. Atrophy assessment in the clinical setting is accomplished via magnetic resonance imaging (MRI) and other neuroimaging modalities. Post-mortem assessment of macroscopic features is standard in neuropathologic evaluations but is often semi-quantitative and subjective. Python coding software, with many tools for object/data manipulation, visualization, and analysis, could serve as a potential research approach for automated analysis of neuroanatomical structures to quantitatively measure atrophy using machine learning (ML). Imported .obj files of 3D scanned brain tissue were visualized and decimated via several Python modules. Based on readily identifiable gyri and sulci, 3D models were segmented and annotated. Segmented models were exported from Blender into a Python-based ML pipeline. Using manual mesh segmentation of healthy brain models, annotated 3D scanned mesh data was used to train various ML models. Trained models were then used to predict labels for unannotated data, and performance was assessed via evaluation metrics for each ML algorithm. Through Python-based ML, we completed texture mapping to segment three-dimensional models based on identifiable gyri and sulci. Our methods demonstrated random forest and decision tree classifiers generated predictions with the highest accuracy, average precision, and recall scores when assigning annotations to unannotated data. Our findings provide support for the utilization of ML techniques to identify specific sub-regions and measure atrophy from 3D brain models. Future validation against other imaging modalities, like MRI, is necessary to confirm model consistency of surface mesh segmentation.

ID 14 - SUBSTANCES OF HEALTH CONCERN: LABEL ACCURACY OF CANNABIDIOL AND TETRAHYDROCANNABINOL IN COMMERCIAL TINCTURES FROM THE UNITED STATES

AUTHORS: Zander Sullivan[1]; Coady Lapierre[1]; Laura Weiser Erlandson[1]; Linh Pham[1] (1.Texas A&M University at Central Texas)

ABSTRACT

In recent years, researchers are particularly interested in cannabidiol (CBD), Δ 8 -tetrahydrocannabinol (Δ 8 -THC), and Δ 9 -tetrahydrocannabinol (Δ 9 -THC). Despite the growing prevalence of these molecules in everyday life, research shows that cannabinoid products are often mislabeled. In this study, we quantified and compared the label accuracy of CBD in full- and broad-spectrum tinctures and evaluated whether there is a public health concern related to CBD, Δ 8 -THC, and Δ 9 -THC. A total of 18 samples from different brands sold online in the United States were collected for this study. Reverse-phase high performance liquid chromatography with ultraviolet/visible light detection (HPLC-UV) was employed to detect and quantify the concentrations of CBD and THC isomers within the samples. Labels were considered inaccurate if the actual concentration of CBD deviated by more than 10% from the labeled amount. Our findings showed that 12 out of 18 samples had inaccurately labeled CBD concentrations. Notably, a significant difference in CBD label accuracy was observed between broad- and full-spectrum tinctures ($p = 0.0282$). No significant correlation was found between the cost of the tinctures and the label accuracy for CBD ($p = 0.2117$). While none of the broad-spectrum tinctures contained Δ 8 -THC, two contained Δ 9 -THC. All full-spectrum tinctures contained both Δ 8 -THC and Δ 9 -THC at levels below the federal limit of 0.3 w/w%. Accurate labeling of CBD and THC in tincture products is a crucial public health concern across the United States. There is a need for the U.S. Food and Drug Administration to promulgate regulations for labeling products that contain CBD and THC.

ID 20 - CREDIT AS A FINANCIAL ASSET: MAXIMIZING OPPORTUNITIES AND MINIMIZING RISKS

AUTHORS: Anthony Dodson[1] (1.Family is forever LLC.)

ABSTRACT

In this informative presentation, Anthony Dodson delves into "Credit as a Financial Asset" and provides insights on

how to leverage it wisely for financial success. Gain a comprehensive understanding of different types of credit, credit score calculation, and the impact of credit on financial health.

Discover practical tips for using credit responsibly to build a positive credit history, obtain favorable loan terms, and access better financial opportunities. Equip your audience with knowledge and tools to make informed credit decisions, navigate the financial landscape with confidence, and harness the power of credit as a valuable financial asset for long-term success.

ID 35 - ACTIVITY OF ATORVASTATIN COMBINED WITH CHEMOTHERAPEUTIC DRUGS ON PATIENT-DERIVED NEUROBLASTOMA CELL LINES

AUTHORS: Chase Drucker1, Surya Banerjee1 (1. Texas Tech University)

ABSTRACT

Neuroblastoma is a pediatric malignancy originating from neural crest cells and is the most common extracranial solid tumor in children. Cisplatin is a drug used in the treatment of neuroblastoma, that is a major cause of hearing loss in children treated with chemotherapy. Statins, primarily known for their cholesterol-lowering effects, have been investigated for their potential anti-cancer properties due to their ability to inhibit the mevalonate pathway, which promotes cell proliferation and cell survival. Atorvastatin, a widely prescribed statin, has been shown to potentially protect against ototoxicity from cisplatin. As a clinical trial of using atorvastatin combined with cisplatin to decrease hearing loss in children with neuroblastoma is being considered, it is necessary to obtain preclinical data to determine if atorvastatin antagonizes cisplatin cytotoxicity for neuroblastoma. We hypothesize that atorvastatin does not decrease the cytotoxicity of chemotherapeutic drugs for neuroblastoma cell lines. The DIMSCAN cytotoxicity assay was used to evaluate the effects of atorvastatin combined with chemotherapeutic drugs on six neuroblastoma cell lines (CHLA-15, CHLA-136, COG-N-519, COG-N-561, COG-N-732, and COG-N-738) under three different oxygen conditions (2%, 5%, and 20%). Treatment with atorvastatin in combination with doxorubicin, vincristine, etoposide, or4-hydroperoxycyclophosphamide (4-HC), the active metabolite of cyclophosphamide, showed no change in cytotoxicity of the chemotherapy drugs in all oxygen conditions. Some decreased cytotoxicity of cisplatin combined with atorvastatin was observed in one cell line. Further investigation into the exact mechanism is needed.

ID 39 - ENGAGE, EXPLORE, EXPLAIN: ELEVATE YOUR VOCABULARY GAME!

AUTHORS: Dustin Perez[1] (1.New Caney ISD)

ABSTRACT

This presentation offers research-based insights into effective vocabulary instruction. Attendees will receive a graphic organizer to streamline their vocabulary lesson planning process. They will learn how to employ engaging word learning strategies, optimize best practices for word walls and anchor charts, and will be equipped with actionable methods to enrich vocabulary instruction.

ID 41 - STRUCTURE AND COMPOSITION OF FORESTS IN THE LEON AND SALADO CREEK GREENWAYS

AUTHORS:

Natalie Martinez[1]; Jeffrey Hutchinson[1] (1.The University of Texas at San Antonio),

ABSTRACT

Greenways are protected natural areas within urban centers that preserve biodiversity of local flora and fauna and provide passive recreation opportunities. Leon and Salado Creeks are ephemeral streams surrounded by forest habitat located in northern San Antonio. Both greenways have unpaved and paved hiking and biking trails that receive moderate to high recreational activity and a diversity of shrubs and trees. Within two greenways, we hypothesized there will be vegetation difference among the upper and middle slopes, and ephemeral stream within and between the greenways. We further hypothesized that a greater number of facultative and obligate wetland shrubs and trees will be documented in the ephemeral creeks. We sampled the upper slope, middle slope, and dry creek (ephemeral stream) on the east and west sides using the point-quarter method during May 2024 to August 2024, eighteen point-quarter plots were placed in each of the 8 locations surveyed in both greenways. Based the point counts, tree and shrub mean richness, diversity, density, d.b.h., basal area, and biomass will be estimated by species. Cursory observations indicate difference between the structure and composition of forests in Leon and Salado Creek Greenways. Results are currently being analyzed and will be presented at the meeting.

ID 50 - VISUALIZING LIQUID-LIQUID PHASE SEPARATION OF INTRINSICALLY DISORDERED PROTEINS

AUTHORS:
Cas Knox[1]; Oliver Kipp[1]; Steven Whitten[1]; Lance English[2] (Texas State University, 2.Temple College)

ABSTRACT
Liquid-liquid phase separation (LLPS) behavior of intrinsically disordered proteins (IDPs) is associated with normal cellular functioning but also disease states when misregulated. ParSe, an algorithm developed in previous work, identifies regions of proteins with a high propensity for LLPS behavior based on the primary sequence. We aim to use both in vitro and in vivo methods to confirm the results of the computational analyses completed with ParSe. In vitro studies were preceded by the purification of the protein of interest from E. coli . Expression testing elucidated proteolytic degradation of the target protein by bacterial host machinery. Investigation of LLPS properties necessitates acquisition of complete and stable target protein. To mitigate proteolytic degradation, we developed a method for using S. cerevisiae for the in vivo methods of analysis of pericentrin (PCNT) and as the expression culture for purification. I am utilizing this previous work to design experimental conditions for the expression and purification of alternate phase separating IDPs (PS IDPs). We are also working on developing an assay aimed at assessing the phase separation propensity of IDPs and missense variations in perturbed solution conditions.

ID 52 - INTERACTIONS AMONG HYDRILLA VERTICILLATA AND TWO COMMON NATIVE AQUATIC MACROPHYTES UNDER GREENHOUSE CONDITIONS

AUTHORS:
Jeffrey Hutchinson[1] (1.The University of Texas at San Antonio)

ABSTRACT
Hydrilla (Hydrilla verticillata) is an invasive aquatic macrophyte found throughout the San Marcos River and every continent except Antarctica colonizing rivers and lakes. Multiple hydrilla management options are available to control hydrilla. Due to the high number of endemic and listed species in the San Marcos River, management options are limited. We examine the ability of the two common, wide-ranging native species water stargrass (Heteranthera dubia) and Illinois pondweed (Vallisneria americana) to suppress or outcompete hydrilla under greenhouse conditions in interaction studies. In this study, there were decreasing root and shoot biomass and relative growth rates for hydrilla as the ratio of water stargrass and Illinois pondweed increased. Hydrilla allocated a significantly greater biomass to its shoots compared to its roots in both the winter and summer ex situ studies. The large amount of biomass allocated to hydrilla allows its shoots to reach the upper water column blocking sunlight and reducing photosynthesis of native plants. Water stargrass and Illinois pondweed had greater relative growth rates compared to hydrilla when planted in higher numbers under ex situ conditions. The results of the ex situ studies found that water stargrass and Illinois pondweed planted collectively or alone cannot suppress or outcompete hydrilla if planted in smaller ratios than hydrilla. The results of this ex situ study indicate that greater number of native aquatic plants must be planted to suppress hydrilla.

ID 54 - MODELING THE EFFECTS OF ACUTE INFLAMMATION ON ENDOTHELIAL BARRIER FUNCTION FROM PDMS-BASED BRAIN MICROVESSELS

AUTHORS: Leila Martinez[1]; Ruoqian Hu[1]; Ying Zheng[1] (1. University of Washington School of Medicine)

ABSTRACT
Despite the clinical benefit of Chimeric Antigen Receptor (CAR) T-cell antitumor treatment, neurotoxicity as a side effect remains a key challenge. Excessive effector immune-cell activation and surge in cytokine release, including tumor necrosis factor alpha (TNF-α) and interferon-gamma (IFN-γ), are risk factors for neurotoxicity linked to cerebral microvascular dysfunction. The mechanism for how cytokine release leads to brain endothelial injury is less understood. Parametric studies of blood components are challenging to perform in vivo and high spatiotemporal resolution imaging of brain vasculature is limited. We engineered a perfusable, 3D human brain microvessel in a poly-dimethylsiloxane (PDMS) based microfluidic channel seeded with primary brain endothelial cells. This system offers simple fabrication and controlled perfusate under hydrostatic pressure. Our aim was to investigate BEC response by characterizing changes in junctional and cytoskeletal protein presentation and immune-endothelial interaction after exposure to an inflammatory stimulus. Overall, we found a dose dependent trend of increased

discontinuity of adherens junctions in brain microvessels using Junction Analyzer Program (JAnaP)-based image analysis. However, at pediatric patient serum levels of cytokine, the effect was negligible, suggesting another mechanism of disease such as increased leukocyte adhesion. To probe leukocyte-endothelial interactions, evaluation of adhesion molecule expression such as intercellular adhesion molecule 1 (ICAM-1) and leukocyte recruitment were conducted post cytokine stimulation using peripheral blood mononuclear cells (PBMCs). Leukocyte binding had an increased trend in treated vessels compared to controls. Ultimately this project has potential to provide new targets for therapeutics in microvascular barrier recovery as an in vitro toxicity testing platform.

ID 56 - A POSITIVE CONTROL: LET US MAKE THE RecA+ STRAIN

AUTHORS: Dylan Dodd[1]; Matthew Dyson[1] (1.Wayland Baptist University)

ABSTRACT

Drug resistance in Mycobacterium tuberculosis bacteria (MTB) is a challenge facing healthcare today. Preliminary findings suggest that the DNA repair protein RecA plays a role in the development of mutations in MTB that lead to drug resistance. To explore the plasmids expressing MTB RecA protein were introduced into E. coli to allow the production of recombinant protein. Surprisingly, multiple attempts from several students came up empty handed. We predicted that either the induction method or the plasmids themselves were at fault. We also recognized we had not included a positive control. To address this, we employed plasmid as a control that expresses a His-tagged green fluorescent protein (GFP) under control of the T7 promoter. Introducing this plasmid into the same bacterial cell line as the RecA plasmids demonstrated that the bacterial induction system worked, as bacteria expressing GFP were immediately discernable under blue light. PAGE followed by Coomassie staining revealed GFP but still did not show detectable RecA protein. However, western blotting of the bacterial lysates detected the His-tagged GFP and RecA proteins. Notably, we only observed the mature form of RecA, suggesting that the protein self-spices its intein just as the endogenous protein in MTB. Using affinity purification targeting the His-tagged proteins, we subsequently showed that both GFP and RecA could be enriched and purified which allowed us to detect mature RecA protein by Coomassie staining.

ID 57 - NO RADIOACTIVITY REQUIRED! A NEW APPROACH TO RecA-MEDIATED DNA STRAND EXCHANGE

AUTHORS: Haley Fossett[1]; Robert Moore[1] (1. Wayland Baptist University)

ABSTRACT

Our lab's research has shown that the binding strength of RecA is sequence-dependent. Weak binding suggests unfaithful repair, which may point to another source of drug-resistant mutations in organisms such as Mycobacterium tuberculosis (M. tuberculosis) . Any link between weak binding and unfaithful repair must be validated by observing strand exchange (SE). The only current method to detect strand exchange is to incorporate a radioactive phosphate on a target strand prior to SE. This method is not available to our lab due to the costs and hazards associated with it. Our lab has been developing a new method to tag and study SE. Instead of using a radio-labeled DNA during SE, we incorporate a biotin tag (biotin-11-UTP) post-SE. This protocol relies on using nonradioactive phosphates as protecting groups on two DNA strands to direct post-SE biotinylation of the unprotected strand. Apyrase is used to remove the biotinylation interferent ATP from the SE reaction, after which the apyrase is denatured to prevent dephosphorylation of the biotin-11-UTP. We were able to carry out strand exchange using our radiation-free DNA labeling protocol, visualized with chemiluminescence to detect the phosphate-directed biotin tag incorporated post-SE on the exchanged strand. The chemiluminescent signal of the exchanged strand had a shape, size, and signal that were all comparable to the positive ssDNA control. The development of this protocol brings our lab one step closer to testing our initial hypothesis: could drug resistance in tuberculosis be a consequence of weak-binding during repair by RecA?

ID 61 - INVESTIGATION OF ITINERANT KAGOMÉ-LATTICE MAGNETS, ZrFe6–xCoxGe6

AUTHORS: Eduarda Stein Christ1; Victoria Li2; Michael Shatruk2 (1. Texas Lutheran University; 2. Florida State University)

ABSTRACT

Kagomé-lattice structures exhibit geometric spin frustration due to the impossibility of simultaneously satisfying all pairwise antiferromagnetic (AFM) interactions between magnetic centers occupying the nodes of such a lattice. These spin-frustrating

interactions typically lead to noncollinear magnetic ordering that can be useful for developing new low-power current-manipulating and data-storage devices. This contribution demonstrates the magnetic properties of magnetically ordered phases in the ZrFe6Ge6 – ZrCo6Ge6, which contains kagomé layers of magnetic transition metal atoms separated by non-magnetic Zr and Ge atoms. A series of the ZrFe 6– x Co x Ge 6 compositions have been synthesized and characterized by X-ray diffraction and magnetic measurements. The evolution of the crystal structure and magnetic behavior with the change in the Fe/Co ratio is discussed.

ID 66 - HISTORIC FIRST LIQUID FUELED ADVANCED NUCLEAR REACTOR PERMITTED BY THE NRC

AUTHORS: Charles Ivey[1] (1. ACU NEXT Lab)

ABSTRACT

The energy of the future must include Nuclear Reactors and the consortium led by ACU and including UT Austin, Texas A&M, and Georgia Tech have achieved a milestone by gaining the first permit ever granted by the NRC to construct a molten salt advanced (Gen four) research reactor (MSR-1) as of September 2024. This project is intended to lead to commercial small modular reactors, SMRs, at approximately 250 MW thermal and are walk-away safe, vastly more efficient than water cooled reactors, with little waste, and transportable via 18-wheeler trucks.

This first reactor will enable the team to determine data never-before obtained that is critical to producing a plentiful energy future for society, providing a pathway to safe and clean water, and producing medical isotopes that are crucial to the diagnosis and treatment of targeted cancers. So far more than 250 researchers from the fields of physics, chemistry, engineering, and many other fields have contributed to the project. And the university has constructed a one-of-a-kind building to house the reactor on campus in Abilene, Texas.

The project is of international interest and is supported by Natura Resources, the Department of Energy, the University, and other sources. First sustainable operation of the research reactor is scheduled to be achieved in 2025 or 2026.

ID 69 - EFFECTS OF STREAM RESTORATION ON CADDISFLIES

AUTHORS: Fernanda Gonzalez[1]; Mark Gustafson[1] (1.Texas Lutheran University)

ABSTRACT

Streams host a variety of aquatic insects that can be used to measure the health of ecosystems. Aquatic insects vary in their sensitivities to changes in their environment, such as urbanization and agriculture in the watershed. Trichoptera (caddisflies) is an order of aquatic insects with a relatively high sensitivity to pollutants and changes to the ecosystem. The restoration and preservation of stream ecosystems can improve and maintain aquatic diversity. We studied two spring-fed tributaries to the Guadalupe River in central Texas. Walnut Branch is located in an urbanized area in Seguin. In 2016, the U.S. Army Corps of Engineers restored a portion of Walnut Branch by creating riffles in the stream and constructing a wall to prevent erosion from the riparian area. Geronimo Creek is located nearby in a rural watershed, and was used as a reference site. We compared the diversity and abundance of Trichoptera before and after the restoration of Walnut Branch to Geronimo Creek. The results show an increase in Trichoptera with higher sensitivity after the restoration. However, Walnut Branch still had lower trichopteran diversity than Geronimo Creek.

ID 70 - COVALENTLY MODIFYING HEPATOCYTES WITH CARBAMATE BIOCONJUGATES

AUTHORS: Johann Karunananthan[1]; Elena McGown[1]; Bob Kane[1] (1.Baylor University)

ABSTRACT

Hepatocyte transplantation (HT) has been studied as a potential treatment for patients with reduced or incomplete liver function. In clinical trials, HT has had limited long-term success as the majority of transplanted cells are lost in the first few hours following surgery due to an acute inflammatory recipient immune response. Our lab previously developed a localized drug-delivery method for cellular transplants which utilizes the covalent modification of surface proteins on cells with prodrugs. Current research aimed at improving our method involves the addition of a release mechanism for the lingering bioconjugate

residue on the transplant cell surfaces following drug release. Since the carbamate is a common moiety in numerous cleavable mechanisms in drug design, we have evaluated the use of carbamate bioconjugates as an alternative to the more common amide bioconjugates. We report the successful modification of isolated hepatocyte cells utilizing carbamate bioconjugates prepared using a mixed carbonate linker. These experiments have demonstrated that carbamate bioconjugates can be used to modify hepatocytes with a 96-hour stability comparable to the more commonly used amide bioconjugates, and with no observable loss of cell viability or function. Our results indicate the potential for carbamate-based reversible cell modification strategies for hepatocyte transplantation. The success of carbamate bioconjugates on hepatocytes has inspired us to perform similar modifications on other tissue applications.

ID 75 - BROADER IMPLICATIONS OF THE CHALLENGES ASSOCIATED WITH BUILDING A FIELD GUIDE TO THE MACROSCOPIC INVERTEBRATE FOSSILS OF THE LOWER WALNUT FORMATION IN TRAVIS COUNTY, TEXAS

AUTHORS: Stacie Skwarcan[1]; Christopher Bell[1] (1. The University of Texas at Austin),

ABSTRACT

The Walnut Formation in central Texas is a richly fossiliferous shallow marine deposit from the middle Albian. Its invertebrate fauna is regularly collected by paleontologists; however, the last comprehensive study of the fauna was undertaken for a dissertation completed in 1941 by W. C. Ikins. We were searching for a field-guide-type resource for students to use for a project on fossils they would collect from the Walnut Formation. Such a resource did not exist, so we made one. During that process, we encountered several challenges that have broader implications for similar marine invertebrate faunas. Not all of the collections from previous work on the Walnut Formation are still accessible; some are lost forever, while others may be in the uncatalogued portions of the Non-Vertebrate Paleontology Laboratory (NPL) collections. We could not find examples in the NPL collections of some taxa that were reported from the Walnut Formation by previous authors; and, surprisingly, we found new occurrences of taxa previously unreported from the formation. The approach taken for identification of most of these taxa is not apomorphy-based. Features listed in standard references in 'diagnoses' for genera and species are a mix of plesiomorphies and apomorphies. As paleontologists who typically work with vertebrate fossils under an approach that relies on apomorphies, we found ourselves using a different methodological and philosophical approach. The taxonomy of many of these organisms needs revision to address unclear synonymies and instances where taxa were named from type material that was poorly preserved or is now lost.

ID 76 - EFFECTS OF INVASIVE CHINABERRY TREE FRUITS ON INVASIVE ASIAN CLAMS IN TEXAS

AUTHORS: Amy Lowe[1]; Marion Mundy[1]; Chris Distel[1] (1. Schreiner University)

ABSTRACT

Corbicula fluminea, an invasive clam, has negative effects on river ecosystems because of its incredible fecundity and competitive ability. Their efficient filtration systems may remediate toxins from invasive species. These clams are often used to test for toxins such as heavy metals, but there is little research on how they filter and survive against natural toxins such as those produced by chinaberry trees (Melia azedarach). In addition to toxin production, chinaberries in water deplete dissolved oxygen quickly. Here we report two ecotoxicological trials with Corbicula fluminea. Using clams from the Guadalupe River, we tested their abilities to (1) survive in the presence of multiple concentrations of whole-berry exposure, as would happen in nature, and (2) to filter out and survive against different concentrations of azadirachtin across multiple concentrations. We used the same number of clams in each tank with multiple concentrations of chinaberries. Clam survival and oxygen did not fluctuate much. In the second trial, treatments with clams had oxygen concentrations comparable to controls for 24 hours longer than other organisms. After a week, turbidity varied differently from dissolved oxygen. In our third trial, we used multiple concentrations of azadirachtin against the same number of clams, and survival did not vary compared to the other trials. We can test to see how much of the toxin is left in the water and infer how much is within the clams' systems. While some clams died, their survival is not as sensitive to chinaberry exposure as crayfish or dragonfly larvae.

ID 80 - MECHANISMS OF TOXICITY AND METABOLIC DISRUPTION BY BISPHENOL ANALOGS IN HUMAN CELL MODELS

AUTHORS: Rafia Afroze Rifa[1]; Ramon Lavado[1] (1. Baylor University)

ABSTRACT

Bisphenols are widely utilized in plastics, coatings, and resins, but mounting evidence points to their endocrine-disrupting potential. Bisphenol A (BPA), for instance, has been linked to adverse health outcomes, spurring regulatory bans and leading to the adoption of alternative bisphenol analogs (BPs). While considered safer, these alternatives may still trigger inflammation and pose risks for chronic conditions, such as cancer, diabetes, and cardiovascular diseases. To address these concerns, this study investigates the metabolic and toxicological impacts of seven common bisphenol analogs—BPS, BPF, BPAF, BPP, BPAP, BPB, and BPE—across eight human cell models, including liver (HepaRG), intestinal (CaCo-2), breast (T47D), brain (HMC-3), lung (MRC-5), kidney (HEK293), and skin (HMEC-1, HEK-001). Cell viability was evaluated via MTT assay after a 24-hour exposure to bisphenol concentrations ranging from 1 pM to 1 mM. ROS generation and mitochondrial membrane potential were assessed to probe cellular oxidative stress and mitochondrial function. Results indicate BPE exhibits the highest cytotoxicity in CaCo-2 cells with an EC50 of approximately 0.2 µM, whereas HEK293 and HepaRG cells showed resilience, particularly to BPS, with EC50 values above 1000 µM. BPAF, BPP, and BPAP showed low EC50 values across cell lines, underscoring a comparatively higher toxicological risk. Higher bisphenol doses correlated with increased ROS and decreased mitochondrial potential, suggesting oxidative stress as a key toxicity mechanism. These findings highlight the health risks associated with bisphenol exposure, supporting stricter regulatory oversight and safe exposure guidelines to safeguard human health.

ID 81 - DELINEATION OF IN VITRO AND IN VIVO OXYSTEROL-MODIFIED RNA ADDUCTS BY DISTINCT TLC SPOTS

AUTHORS: Abby Sweeney[1]; Adaeze Ozuzu[1]; Craig Younce[1]; Godwin Ifere[1] (Hardin-Simmons University, Abilene, TX)

ABSTRACT

Our preliminary studies show that, like the double-stranded DNA molecules (dsDNA), RNA surrogates comprising single-stranded DNAs (ssDNA) can undergo chemical modifications by oxysterol analogs of sterol hormones; however, the appearance of "single spots" of these oxysterol-modified RNA surrogates in thin layer chromatographic (TLC) analysis could not be accomplished. Here, we report the prospect of forming a distinct spot of this adduct on a TLC plate following the oxysterol modification of a specific and pure RNA species obtained by gel electrophoresis separation and purification. Unlike standard agarose-formaldehyde gel electrophoresis, an alternative "pK-matched" Hepes/triethanolamine (HT)-buffered system improved the overall separation quality of the different RNA species to resolve the distinctive 18S rRNA, a vital component initiating the translation process. Careful extraction and purification of this distinctive 18S molecular species of rRNA from a denaturing agarose gel boosts the resolution and detection of the oxysterol adducts of this single-sized RNA species as a single TLC spot. This reproducible TLC separation of 18S rRNA adducts provides a simple, cost-effective model for characterizing and monitoring in vitro and in vivo oxysterol-modified and unmodified RNA.

ID 84 - MECHANISTIC ANALYSES OF DNA LESION RECOGNITION AND REPAIR IN THE EUKARYOTIC GLOBAL GENOME NUCLEOTIDE EXCISION REPAIR

AUTHORS: Temilade R. Adeniran[1]; Linh Pham[2]; Kenji Murakami[2]; Jung-Hyun Min[1] (1. Baylor University; 2. University of Pennsylvania)

ABSTRACT

DNA damage from endogenous and exogenous sources can form bulky lesions that, if unrepaired, may cause cancer and developmental disorders. The global genome nucleotide excision repair (GG-NER) pathway addresses this through coordinated protein complexes that remove and replace damaged DNA strands. The XPC-RAD23B-CETN2 complex (Rad4-Rad23-Rad33 in yeast) initiates repair by recognizing lesions and recruiting TFIIH for DNA unwinding, followed by dual incision and repair synthesis. To better understand this process, we are investigating three aspects of NER. First, we aim to improve the structural resolution of the Rad4-Rad23-Rad33-coreTFIIH complex beyond the current 7.9-9.2 Å and determine the first structure of Rad4-Rad23-Rad33 with holoTFIIH (consisting of the 3-subunit CAK (TFIIK) and the 7-subunit coreTFIIH). Using Rad4 truncation mutants to reduce flexibility, we successfully assembled complexes with coreTFIIH and holoTFIIH, now undergoing cryo-EM analysis. Second, we are examining how DNA topology affects NER efficiency by developing covalently closed DNA substrates that better mimic cellular conditions. We have successfully created circular single-stranded DNA and are preparing lesion-containing double-stranded substrates for mechanistic studies.

Finally, we are reconstituting the complete NER pathway in vitro using purified proteins and specialized DNA substrates. By

integrating structural studies with insights into DNA torsional constraints and protein-DNA interactions, we aim to advance our mechanistic understanding of this essential repair pathway.

ID 87 - DIVERGENT GENE EXPRESSION BETWEEN THE EYES OF SURFACE AND SUBTERRANEAN SALAMANDER SPECIES FROM CENTRAL TEXAS (CLADE PAEDOMOLGE) THROUGH DEVELOPMENT

AUTHORS: Ruben U. Tovar[1]; Brittany A. Dobbins[2]; Rebecca L. Young[1]; Katherine Bockrath[3]; Thomas J. Devitt[1]; Dana M. García[2]; David M. Hillis[1] (1. The University of Texas at Austin; 2. Texas State University; 3. US FWS-SMARC)

ABSTRACT

Understanding the molecular and developmental mechanisms responsible for morphological similarities remains a central question in evolutionary-developmental biology. Groundwater salamanders (genus Eurycea) from central Texas offer exceptional potential to address this question because of past, independent invasions of subterranean environments. Members of this clade exhibit variation along a continuum of morphological adaptations to the environmental pressures of life underground. Organisms that occupy subterranean habitats converge on similar phenotypes thought to be the outcome of similar selective pressures. We observe differences between divergent phenotypes, and parallels between similar phenotypes in eye tissue through development. However, the underlying molecular mechanisms responsible for our observation of eye morphology have yet to be fully understood. To understand if similar patterns of gene expression parallel our morphological observations, we used high-throughput RNA sequencing (Tag-seq) to compare expression differences within a >3,000 eye developmental transcriptome comprised of three surface and three subterranean lineages through development (three individuals from each of five early developmental stages (1-5 months post-oviposition) and an adult stage). Gene expression patterns vary across developmental stage and between surface and subterranean phenotypes. Interestingly, these results suggest differences in early gene expression between divergent phenotypes, but paralleled gene expression among similar phenotypes. We discuss overall patterns of variation in gene expression and identify genes with parallel expression changes across species and developmental stages. Together, identifying patterns of gene expression coupled with morphology will allow us to better understand the evolutionary and genetic underpinnings responsible for eye loss within a morphologically diverse radiation of tetrapods.

ID 89 - THE SILICON-GERMANIUM BOND

AUTHORS: Keith Pannell[1] (1. University of Texas at El Paso)

ABSTRACT

Compounds containing a Si-Ge bond, R 3 Si-GeR 3 , (R = a variety of organic radicals and transition metals such Fe and Mo) will be presented in terms of their structural variation, photochemistry, and rearrangements. The chemistry demonstrates both the similarity and significant distinctions between the tow metalloid elements and suggests new chemistry for a range of inter-element bonded materials.

ID 95 - METHODS CONNECTING DIFFERENTIAL OPERATORS AND COMBINATORICS

AUTHORS: Jonathan Thomas[1], William Erickson[1] (Baylor University)

ABSTRACT

At first glance, combinatorics and calculus seem like polar opposites: combinatorics studies discrete problems (such as arrangements and enumeration), while calculus deals with continuous change. In this talk, however, we will show a surprising way to solve some classic problems in combinatorics using nothing other than the most basic idea in calculus: the derivative. In particular, to each combinatorial problem, we associate a certain differential operator and a multivariate monomial. Upon applying some power of the operator to the monomial, we can view the result as a generating function that easily reveals the answer to the original combinatorial problem. This unexpected connection should be of particular interest to students and teachers of calculus and combinatorics.

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ID 100 - MEASURING THE EFFECTS OF AEROSOL EXPOSURE: DOSE-RESPONSE DYNAMICS AND POTENTIAL OUTCOMES

AUTHORS: Taylor Jefferis[1]; Dinny Stevens[1]; Kiera Griffin[1]; Yanira Baldovinos[1]; Christie Sayes[1] (1. Baylor University)

ABSTRACT

The air we breathe is contaminated with mixtures of potentially hazardous substances that can result in acute and chronic health effects depending on the inhaled dose. Researchers frequently test the effects of aerosolized substances on in vivo animal models and in vitro lung cell models using a known potential dose; however, the internalized or biologically effective dose is often not reported. This work expands upon previous studies by developing laboratory experimental methods to measure all four U.S. EPA-relevant dose types: (1) potential dose, (2) applied dose, (3) internal dose, and (4) biologically effective dose. A multiple-cell co-cultured human lung model using epithelial cells and macrophages was developed for aerosol exposure to occupational-relevant substances, namely methacrylic acid and aluminum colloids. To control for the initial dose, a dry particle generator, and nebulizer were used for aerosol production of each chemical individually and in a binary mixture. The resultant aerosols were characterized by particle size distribution and gravimetric analysis to report the potential and applied dose values. The applied and internal doses were measured using mass spectrometry to analyze samples of spent cell culture media and cell lysate. Finally, the biologically effective dose was measured by examining dose-response relationships via assays measuring lethality and mitochondrial disruption. This work demonstrates methods for dosimetry data collection, which can then be included in human health risk assessments of aerosolized toxicants to increase practical applicability in humans.

ID 102 - IMPACT OF TOPOLOGY ON CORAL LARVAE SETTLEMENT ON CONCRETE MATRICES

AUTHORS: Jennifer Hunt[1]; Brian Flowers[1]; Thomas Ready[2] (1. University of Texas Permian Basin, 2. Independent Scholar)

ABSTRACT

Coral reefs are essential ecosystems, supporting biodiversity and protecting coastlines from storms. However, global threats, including climate change and pollution, have led to significant coral bleaching and mortality. To combat these declines, artificial reefs have been created to facilitate coral recovery. However, these artificial structures often fail to attract sufficient coral larvae for long-term settlement and growth. By investigating how the topology of concrete surfaces impacts coral larvae settlement, this research seeks to improve artificial reef designs and make coral restoration efforts more effective. This project used different topological features on 3D-printed concrete matrices to influence the settlement of coral larvae. By understanding how these features affect coral settlement, we aim to enhance artificial reef designs to promote coral growth, supporting coral restoration efforts in degraded marine ecosystems. Concrete "cupcakes" with four channel spacings (smooth, 1.27 mm, 2.54 mm, and 5.07 mm) were 3D-printed to mimic reef structures. The cupcakes were then deployed around several dive sites in Tela Bay, Honduras, and left for different periods of time to observe marine organism settlement patterns. Initial findings suggest that small and medium channels exhibit higher rates of living organisms, particularly tubeworms. In contrast, smooth and large channels show a greater prevalence of algal coverage. Further analysis, including microscopy, DNA extraction, and "shotgun" sequencing, will be conducted to identify and quantify the diversity and abundance of species present on the concrete cupcakes.

ID 104 - SCREENING COMPOUNDS FOR THEIR ANTI-CELL PROLIFERATION PROPERTIES

AUTHORS: Tina Prajapati[1]; Rachna Sadana[1] (1. University of Houston-Downtown)

ABSTRACT

Cancer encompasses a diverse array of forms and characteristics, all fundamentally linked to abnormal cell proliferation. Unlike healthy cells, cancer cells evade apoptosis, programmed cell death, due to disruption of regulatory signaling pathways. Cancer cells are constantly mutating, resulting in resistance to current cancer treatments, demanding the discovery of new cancer drugs. In our laboratory, we evaluate the effects of novel synthetic compounds, designed to have enhanced efficacy and reduced toxicity, on cancer cell survival. In this study, we evaluated 17 compounds of a series coded as TZ. The compounds are provided by collaborators from India who form derivatives of a working compound by altering functional groups. Using a colorimetric MTT Proliferation Assay, we assessed these compounds at 20μM final concentration against MOLT 4 (leukemia), A549 (lung cancer), BXPC3 (pancreatic cancer), and MCF7 (breast cancer) cell lines for survival. The TZ series demonstrated promising results, with compounds TZ5, TZ62, TZ68, TZ70, and TZ71 reducing cell survival by over 50%. Further analysis using Caspase 3/7 assays for apoptosis induction revealed that TZ62, TZ70, and TZ71 enhanced caspase 3/7 activity significantly, implying these compounds induced apoptosis by cleaving protein substrates. However, subsequent testing with a Mitochondrial Membrane Potential Assay, using a stain accumulating in mitochondria showing aggregate in healthy cells, did not show a loss of mitochondrial membrane potential, suggesting an alternative apoptosis pathway. Future research will focus on determining if TZ62, TZ70, and TZ71 compounds can prevent metastasis of cancer cells using wound closure assay and cell migration invasion assay.

ID 105 - HISTORICAL WELLS AND AQUIFER DEPLETION RATES ON THE TEXAS HIGH PLAINS

AUTHORS: John Stout[1] (1. USDA-Agricultural Research Service)

ABSTRACT

The development and utilization of the Ogallala aquifer was a critical factor that contributed to the transformation of the Texas High Plains from rangeland to highly productive cropland. However, the extraction of groundwater has also led to the gradual depletion of this resource. The total amount of water loss remains uncertain due to insufficient knowledge of groundwater conditions before large-scale exploitation began. The earliest observations of the water table in this region were obtained by Charles Baker in 1914. Baker's water level observations were collected only a few years after the first irrigation wells were drilled into the Texas High Plains. These early observations offer valuable insight into "pre-development" groundwater conditions. By combining Baker's early observations with subsequent measurements obtained by federal and state scientific organizations and local water districts, it is possible to obtain long-term and nearly continuous records of a receding water table at various locations across the Texas High Plains. The rate at which the water table is declining is directly related to the rate of aquifer depletion. Results suggest that although the Ogallala aquifer is still being depleted at a rapid rate; in most cases, producers appear to be using less water today than in the past.

ID 106 - MENTAL-MIXTRAL: AI-POWERED MULTI-MODAL MOOD DISORDER DETECTION

AUTHORS: Nikila Swaminathan[1] (1. Allen Highschool)

ABSTRACT

Mental and mood disorders are major global health concerns, especially among adolescents who are particularly vulnerable to issues like depression and stress. Current methods for diagnosing these conditions often rely on self-reports and clinical interviews, which can miss the full picture of an adolescent's emotional state. Social media platforms present a unique opportunity for early detection, as teens frequently share their emotions through a mix of text and images.

This study tackles the limitations of relying on just unimodal data by creating Mental-Mixtral, a deep learning model that combines both text and visual information. The model was fine-tuned using QLoRA and achieved an impressive F1-score of 0.922 for detecting stress and a recall of 97.98% for detecting depression, outperforming other methods. These results prove the model's ability to detect mental health indicators from multiple sources.

Mental-Mixtral bridges the gap between traditional clinical approaches and how adolescents express themselves in everyday life. It performed better than earlier models in identifying mental health issues, reducing the chances of missing cases of stress or depression.

By integrating this model into the MindWay app, the study offers a way to monitor mental health early without being intrusive. This approach also makes mental health support more accessible while helping reduce the stigma and challenges around seeking

help. Future research will focus on ethical concerns like data privacy and improving the model's reliability with different groups of people. This work sets the stage for multimodal AI to improve adolescent mental health and overall well-being.

ID 108 - DEVELOPMENT AND SYNTHESIS OF IMPROVED PRODRUGS OF TAK-242 (RESATORVID) FOR LOCALIZED AND CONTROLLED DELIVERY

AUTHORS: Chloe Sells[1]; Jessica Kostyo[1]; Bob Kane[1] (1.Baylor University)

ABSTRACT

Our lab is interested in developing prodrugs that can be conjugated to cell or tissue surfaces for the effective delivery of the TLR4 inhibitor TAK-242. The localized and sustained delivery of this sulfonamide drug has potential in a variety of applications, providing a reduction of local inflammation while minimizing risk from off-target effects and systemic toxicity. Our strategy for controlling the release kinetics of these prodrugs utilizes a beta-eliminative release controlled by an aryl sulfone modulator. Our initial prodrug design suffered from a competing drug decomposition via sulfonamide hydrolysis, while the drug release in a second series of prodrugs proceeded via a relatively stable intermediate which complicated our attempts to control the release kinetics. This presentation will highlight work on a third generation of TAK-242 prodrugs that utilize an aniline-stabilized methylene bridge spacer between the sulfonamide nitrogen and the conjugatable linker. This prodrug structure avoids the competing decomposition of generation 1 and provides a much more rapid self-immolation of intermediates than generation 2.

ID 109 - SPATIO-TEMPORAL PATTERNS OF ENVIRONMENTAL DNA DETECTABILITY FOR A CRYPTIC SPECIES OF GREATEST CONSERVATION NEED

AUTHORS: Kyra S. Woytek[1]; William I. Lutterschmidt[1]; Christopher M. Schalk[2]; Daniel Saenz[2] (Sam Houston State University; 2. U.S. Forest Service)

ABSTRACT

Environmental DNA (eDNA) has recently emerged as a valuable and minimally-invasive tool to determine the presence of rare or cryptic species, particularly in aquatic environments. The alligator snapping turtle (Macrochelys temminckii), a large freshwater turtle native to the southeastern United States, is a species of greatest conservation need (SGCN) in Texas and a candidate for listing as threatened under the Endangered Species Act. Information on its status across its range is limited because of its cryptic behavior and low detectability, factors which make it an ideal candidate to assess the utility of eDNA in monitoring efforts. We present data from a 12-month sampling period of 9 sites where alligator snapping turtles are known to occur in east Texas, plus a negative control site outside of their range. Water samples were collected with abiotic measurements (including water temperature, pH, flow velocity, and dissolved oxygen), to evaluate their potential influence on eDNA detectability. The majority of positive samples came from lotic sites, with almost half of all detections occurring from October-December. On average, positive samples were collected from sites with lower temperatures, higher levels of dissolved oxygen, and higher turbidity. These results demonstrate the potential for environmental variables to be used to predict eDNA results in an area where an organism is already known to be present. Results from this study may help to inform methods for a more targeted sampling effort for this species by determining optimal conditions for collecting eDNA samples, thus more accurately reflecting occurrence of alligator snapping turtles.

ID 111 - BUILDING AN UNDERSTANDING OF AB-INITIO CALCULATIONS IN STEPS

AUTHORS: Benny Armey[1] (1. Sam Houston State University)

ABSTRACT

The majority of Computational Chemistry classes focus either on the use of software packages to perform calculations and produce results or on developing a solid derivation of theoretical foundations and selection rules. Both are important, but the student generally does not have grasp of the connection between the two very different paradigms. We have developed a modular series of excel based experiments in which the student works through the basic Hartree-Fock algorithm to solve progressively more incompassing problems. (1) Huckel MO module introducing the LCAO wavefunction and optimization of the expectation value, (2) Hydrogen atom module introducing the transformation of the overlap matrix to the unit matrix. (3) Hydrogen molecule cation (H 2 +) introducing two-centered orbitals and integrals. (4) Helium atom introducing the two electron integrals and the Self-Consistent-Field

(SCF) calculation. These dry lab experiments are readily possible as we provide an Excel macro to do the laborious but necessary work determining the eigenvalues and eigenvectors as part of each module. We have found that this series also provides an excellent opportunity for the introduction and use of matrix operations which have fallen out of favor in the K-12 curriculum but are the bread and butter of Statistics, Analytical Chemistry, and Computational Chemistry. The modules, their results, and some of the problems encountered will be discussed.

ID 113 - DO GRASSES OF CENTRAL TEXAS USE WATER STORED IN LIMESTONE?

AUTHORS: Eli Hartung[1] (1. Texas State University)

ABSTRACT

In karst, substantial amounts of water are stored in the rock matrix, both in weathered bedrock below the soil and in soil embedded rock fragments. Previous research has documented that trees use bedrock water as a persistent reservoir to mitigate drought effects. However, whether herbaceous plants benefit similarly remains unknown. Here, I am to determine if and how grass species of central Texas use water stored in limestone fragments during intermittent drought. I hypothesized that, during drought, grasses common on limestone outcrops would use rock water to maintain higher photosynthetic rates relative to plants without access to limestone rock. I grew four grass species, Muhlenbergia reverchonii (limestone specialist), Sorghastrum nutans (excluded from outcrops) , Bothriochloa laguroides and Bothriochloa ischaemum (two habitat generalists), in greenhouse in pots containing rock-soil mixtures of equal volume: 1) 33% limestone rock, representative of Edwards Plateau soils, 2) 33% inert rock, and 3) 0% rock. After initial establishment, all plants were droughted, well-watered, then droughted again over an eight week period, and harvested afterward. I found similar gas exchange rates across species during well-watered periods, irrespective of rock-soil mixtures. However, limestone in soil significantly increased photosynthetic rates in M. reverchonii relative to S. nutans during drought, while the two generalist species had intermediate responses. Root: shoot ratios were consistently greatest in the limestone mixture and this was most pronounced in M. reverchonii . This study provides the first direct evidence of rock-stored water supporting herbaceous plants during drought and furthermore suggests that specific plant traits can improve this ability.

ID 114 - ROLE OF THE NAC LINKER IN EARLY PROTEIN SORTING

AUTHORS: Travis Bishop1; Emir Maldosevic1; Ahmad Jomaa1 (1. University of Virginia)

ABSTRACT

The nascent polypeptide associated complex (NAC) is a ribosome-bound chaperone that supports the proper sorting and processing of nascent protein chains during translation. Previous studies have demonstrated that hydrophobic endoplasmic reticulum (ER) signals destabilize NAC binding to the ribosome, allowing for NAC to recruit factors to the ribosome that assist in targeting proteins to the ER. However, for ribosomes translating mitochondrial proteins, NAC adopts a different conformation which allowed us to identify previously uncharacterized contacts between NAC and the ribosome. We hypothesize that disrupting these contacts will influence NAC binding to the ribosome and lead to non-specific ribosome association with the ER-embedded Sec61 translocon. To test this hypothesis, in vitro ribosome binding assays and ex vivo competitive binding experiments between NAC and the Sec61 translocon were performed.

ID 117 - FIRST PRINCIPLE CALCULATIONS OF EFFECTIVE HUBBARD PARAMETER

AUTHORS: Manjula Raman[1]; Anjy-Joe Olatunbosun[1]; Kenneth Park[1] (1. Baylor University)

ABSTRACT

Using the constrained density functional theory (cDFT), the Hubbard effective on-site Coulomb interaction (U eff =U−J) has been calculated for transition metal monoxides and dioxides, including TiO, MnO, FeO, NiO, and TiO 2 . The Ueff parameter was systematically evaluated for different muffin-tin radii (R MT) ranging from 2.0 to 2.6 a.u, utilizing the

full potential linearized augmented plane wave method. Our results shows that the Hubbard U is affected by the size of the local projection, showing a decrease in the value of U as the muffin-tin radius R MT increases.

ID 119 - OPTIMIZING BIOMASS PYROLYSIS AND SYNGAS REFORMATION: A STUDY ON MICROWAVE REACTOR VARIABLES AND EFFICIENCY

AUTHORS: Chase Rheinlander[1]; Chao Dong[1] (1. University of Texas Permian Basin)

ABSTRACT

Biomass pyrolysis, with downstream syngas reformation, is a promising approach to sustainable fuel production, however, optimizing consistent syngas yields and purity remains a challenging endeavor. Variations in microwave absorption capabilities among a multitude of biomasses, and the various reactor limitations only hinder its efficiency potential. To address these limitations, our study investigates simplistic, yet efficacious experimental designs that could enhance both yield and purity in syngas production.

We specifically investigated the use of the activated carbon residual within our reactors for microwave absorption validity alongside materials like iron balls and nickel foam catalysts that facilitate microwave discharge during reformation. We aim to show the integration of these materials concurrent with adjustments in microwave wattage and reaction times, significantly improves syngas output. Gas Chromatography-Mass Spectrometry (GC-MS) analysis confirms that these variables participate in a favorable proportionality of hydrogen, methane, carbon monoxide, and carbon dioxide yield.

Our findings reveal that adding these simplistic and yet effective variables demonstrate experimental competency with optimal syngas purity. Our empirical observations are additionally aided by quantitative insights, further supporting the role of our tested microwave-reactive materials. This research underscores the potential for improved biomass pyrolysis techniques to contribute to more efficient, scalable biofuel production. Broadly, in the conversation of practicality, we posit these advancements not only offer pathways for cleaner fuel production in various industrial processes, but also pave the way for renewable energy innovations in chemical feedstock development.

ID 123 - A DOUBLE-BLIND, PLACEBO-CONTROLLED STUDY ON PROBIOTIC TREATMENT FOR HALITOSIS

AUTHORS: Sehyeon Song[1]; Jihye Choi[2]; Min Ji Jang[1]; Md Ariful Haque[1]; Jin Seok Moon[2]; Keon Heo[2]; Myeong Soo Park[2]; Seockmo Ku[1] (1. Texas A&M University; 2. BIFIDO Co., Ltd.)

ABSTRACT

This study investigated the efficacy of Complex OK oral probiotics, containing Lactobacillus gasseri HHuMIN D and Lactobacillus paracasei OK, in reducing halitosis by analyzing volatile sulfur compounds (VSCs) and related metabolic markers. A 12-week, randomized, double-blind, placebo-controlled human clinical trial was conducted, involving 80 participants, of whom 70 completed the study. Significant reductions in hydrogen sulfide (H_2S) and total VSCs were observed in the experimental group compared to the placebo group. Interestingly, clinical oral health indicators (TPI, GI, PI, SI, PHP) and levels of harmful oral bacteria (Porphyromonas gingivalis, Prevotella intermedia, Fusobacterium nucleatum, Streptococcus mutans) showed no significant differences between groups, indicating that Complex OK preserved oral microbial balance.

Additionally, systemic metabolic effects were observed, with significant reductions in blood glucose levels and increases in blood phosphorus levels in the experimental group. These findings suggest that Complex OK reduces VSCs through systemic pathways, including enhanced glucose and phosphorus metabolism, rather than direct bacterial inhibition. The probiotic's potential to influence VSCs originating from non-oral sources, such as the gastrointestinal tract, is particularly noteworthy.

This is the first study to highlight the role of glucose and phosphorus metabolism in systemic VSC reduction, providing a novel mechanism for halitosis management. Complex OK, containing Lactobacillus gasseri HHuMIN D and Lactobacillus paracasei OK, offers a safe, effective, and sustainable alternative to traditional treatments, reducing halitosis without disrupting the oral microbial ecosystem.

ID 129 - STRUCTURE AND MECHANISMS OF NUCLEOTIDE EXCISION REPAIR IN YEAST

AUTHORS: Jung-Hyun Min[1] (1. Baylor University)

ABSTRACT

Nucleotide excision repair (NER) is a highly conserved DNA repair pathway in eukaryotes and repairs DNA lesions caused by diverse environmental agents such as UV, pollutants, cigarette smoke, etc. The lesions, if left unrepaired, block essential cellular functions and lead to cell death or diseases. In yeast, the XPC homolog, Rad4, localizes to diverse lesions and recruits the downstream factor, transcription factor IIH (TFIIH) complex, to the damaged sites. This recruitment subsequently leads to the recruitment of other NER factors, including Rad14, RPA, Rad1-Rad10, and Rad2, which results in the excision of the damaged DNA. Interestingly, yeast possesses another paralog of Rad4 called Rad34 that is only required for ribosomal DNA repair. In this talk, I will present our progress on (1) the role and mechanism of Rad34 for rDNA repair and (2) the structural mechanism of Rad4-mediated NER, using cryo-electron microscopy and fluorescence lifetime studies.

ID 130 - FROM DUST TO DAWN: THE SEARCH FOR YOUNG STELLAR OBJECTS

AUTHORS: Peter Newcomer[1]; Luisa Rebull[2]; April Andreas[1]; Kivan Andreas[1]; Andres Mar[1]; Mickayla Tosch[1]; David Dahari[3]; Gabriel Dahari[3]; Sahar Sultani[3]; Joseph Perry[4]; Ricky Perry[4]; Maddie Sullivan[4]; Jeff Benter[5]; Bo Zeleznik[5]; Jackson Ritchie[5]; Tanner Hurliman[5]; Jack Benter[6] (1. McLennan Community College, Waco, TX; 2. Caltech-IPAC/IRSA Pasadena, CA; 3. Berkshire School Sheffield, MA; 4. Palmyra - Macedon CSD Palmyra, NY; 5. Tri-Valley High School, Downs, IL; 6. Le Roy High School, Le Roy, IL)

ABSTRACT

Our research focuses on identifying young stellar object (YSO) candidates in two regions we refer to as SCR1 and SCR2 that are along the northern galactic plane in the constellation Cassiopeia. These regions have also been included in previous studies looking for YSOs; over both these regions, one study found 19 candidates using Hα-excess, another study discovered 52 candidates using infrared excess. In the same regions, 8 more candidates were identified using proper motion and another located 30 Class II YSO candidates using a machine learning algorithm that looked at multiple search criteria. In our study, we are combining archival data, to include the aforementioned studies, using multiple wavelengths to further assess each previously published candidate, as well as discover new, previously unidentified candidates using IR excess. Confirming more YSO candidates will improve search parameters used in future studies. We are using infrared data as well as optical data to create a band-merged catalog to identify and evaluate YSO candidates using Color-Color Diagrams (CCDs), Color-Magnitude Diagrams (CMDs), Spectral Energy Distribution Diagrams (SEDs), Light Curves, and visual inspection of images. By using more data than any previous study of our two regions, we aspire to be able to make an up-to-date assessment of whether the previously identified candidates are really YSOs, and identify new candidates that have been overlooked in prior studies. Having an accurate picture of what a young star looks like and the conditions that they form in will put us on better footing for future research and exploration.

ID 134 - DETERMINING SPECIES BOUNDARIES IN THE SPRINGSNAIL PYRGULOPSIS (MOLLUSCA, GASTROPODA, HYDROBIIDAE)

AUTHORS: Kathryn Perez[1]; Trenton Meadows[1]; Chante Lundskog[2]; Eric Miskow[3] (1. UTRGV; 2. Utah DNR; 3. Nevada DCNR)

ABSTRACT

In desert environments, unique communities of animals, plants, and microbes depend on groundwater at springs and cienegas. There is a diverse radiation of small (<5 mm) snails found across the desert southwest in North America,

thought to mostly consist of single-site endemics, confined to single springs. As such, nearly all springsnail species are considered critically imperiled with their existence depending on maintenance of spring-flows in regions of declining water availability. Taxonomic work primarily based on mitochondrial sequences or penial morphology of species assumed to be single-site endemics delineated many species and unnamed lineages that are the subject of the current investigation. In these studies, we are applying DNA data (mitochondrial and nuclear) and several morphological features (shell shape, radula tooth shape/size, penial morphology) to the taxonomy of Pyrgulopsis . We have re-examined the validity of several named species and determined whether unnamed mitochondrial lineages should be formally described. To date, we have proposed the synonymy of P. nonaria and P. transversa with P. pilsbryana . In another clade, we have supported the species-level status of very closely related but distinct P. serrata and P. marcida and propose that a lineage referred to in the literature as “Lineage C” should be formally described. We have found a mix of over and under-splitting, that we attribute in part, to overreliance on the assumption that springsnails are single-site endemics, and therefore disregarding potential geographic variation in DNA and morphology.

ID 145 - LOCATION-INDEPENDENT AXON PATHFINDING IN THE HINDBRAIN OF LARVAL ZEBRAFISH

AUTHORS: Annika Tracy[1]; Kimberly McArthur[1] (1. Southwestern University)

ABSTRACT

During early brain development, motor neurons in the hindbrain must receive appropriate synaptic inputs to drive behavior. The role of motor neuron positioning in that process is still unclear. For example, facial branchiomotor neurons (FBMNs) in larval zebrafish generate feeding and breathing behaviors and normally migrate from rhombomere 4 (R4) to rhombomere 6 (R6). However, migration mutants (in which FBMNs fail to migrate out of R4) can still produce functional feeding and breathing behaviors. This suggests that neurons can extend their axons to form synapses on FBMNs, even when FBMNs are in the “wrong” location. Here we show that presynaptic inputs to FBMNs can remodel their axons in migration mutants, consistent with their ability to target FBMNs independent of FBMN location. One likely source of presynaptic input to FBMNs are the cranial relay neurons (CRNs). CRNs relay excitatory signals from the escape circuit to cranial and pectoral motor neurons, including FBMNs. This study used single-cell electroporation of fluorescent dye to trace and analyze CRN axon projections into R4 and R6 of wild-type and migration mutant larval zebrafish. The total axon path length and number of terminal branches extended into R4 was greater in migration mutants than in wild-type zebrafish. Conversely, the total path length and number of terminal branches extended into R6/7 was greater in wild-type compared to migration mutants. This result is consistent with CRN axons projecting to FBMNs regardless of FBMN location. Future studies will investigate the mechanisms of this location-independent axon pathfinding in the vertebrate hindbrain.

ID 146 - DISSIPATIVE QUANTUM SYSTEMS WITH NON-LOCAL POINT INTERACTIONS

AUTHORS: Christoph Fischbacher[1]; Chloe Povey-Rowe[1]; Brady Zimmerman[1]; Danie Paraiso[1] (1. Baylor University)

ABSTRACT

In this talk, we will discuss dissipative operators of the form $i\frac{d}{dx}+V$, where V is a bounded dissipative potential. Besides V, there are two additional sources contributing to the dissipativity of the system: (i) dissipative boundary conditions and (ii) so-called non-local point interactions. Mechanism (ii) is less standard and leads to interesting new problems, even in the first-order case.

We will discuss necessary and sufficient conditions for the operators to be maximally dissipative, the spectrum of the first-order operators as well as the completeness and Riesz basis properties of their root vectors and the possibility of choosing the non-local point interaction in such a way that it generates a real eigenvalue even if it is very dissipative.

ID 147 - ANTIMICROBIAL APPLICATIONS OF PROBIOTIC BYPRODUCTS IN FOOD SAFETY

AUTHORS: Min Ji Jang[1]; Md Ariful Haque[1]; Hae Woong Park[2]; Seockmo Ku[1] (1.Texas A&M University; 2. World Institute of Kimchi)

ABSTRACT

This study aimed to explore the potential use of culture waste broth, specifically the cell-free supernatant (CFS) from Lactiplantibacillus plantarum in probiotics production, for controlling foodborne pathogens like Salmonella Typhimurium and Listeria monocytogenes . Due to its high pH and buffering capacity, the CFS alone showed minimal bactericidal effects despite its organic acid content. To enhance its antimicrobial activity, mild heat treatment at 45°C was applied, with the novel combination of CFS and mild heat (CFS MH) showing a significant reduction of S. Typhimurium by 5.14 log CFU/mL in 6 minutes. This synergistic effect surpassed the results of either CFS or mild heat treatment alone, although L. monocytogenes was not similarly affected. Applied on radish sprouts, the CFS MH treatment reduced aerobic plate and coliform counts by 2.19 and 2.98 log CFU/mL after 3 minutes, with reductions sustained over 7 days at refrigerated temperatures. Microbiome analysis confirmed a decrease in Enterobacteriaceae following treatment. This study suggests that waste broth from probiotics production can be effectively repurposed as a control agent against foodborne pathogens when combined with mild heat. Additionally, it evaluates the economic benefits of using this waste product as a sustainable sanitizer, proposing process designs for re-/upcycling prebiotic waste broth. By offering both an antimicrobial solution and a sustainable approach, this work presents a roadmap for enhancing the environmental and economic value of probiotics production through innovative waste utilization strategies.

ID 148 - AUGMENTING COGNITIVE BEHAVIORAL THERAPY FOR MAJOR DEPRESSIVE DISORDER WITH TRANSCRANIAL INFRARED LASER STIMULATION

AUTHORS: Douglas Barrett1; Christopher Beevers1; Francisco Gonzalez-Lima1 (1. University of Texas at Austin)

ABSTRACT

Transcranial infrared laser stimulation (TILS) is a noninvasive form of photobiomodulation that facilitates prefrontal cortical energy metabolism and oxygenation, resulting in cognitive-enhancing effects. Cognitive behavioral therapy (CBT) is a mainstream treatment for major depressive disorder (MDD). This is the first study to investigate whether TILS would augment the antidepressant effects of internet-based CBT. Sixty participants with MDD were given access to Deprexis, a form of internet-based CBT, for twelve weeks. After the first two weeks, the forty participants improving at least 10% in depressive symptoms from baseline, as measured by the Quick Inventory of Depressive Symptomatology (QIDS-SR), were randomly assigned to Deprexis in combination with TILS or sham-placebo. There were no significant group differences in demographics and initial depression data. There was a 43% reduction in QIDS-SR scores in the sham group from the initial score to Week 12, while adding TILS as an adjunct therapy resulted in a reduction of 56%. Therefore, TILS resulted in an additional 30% reduction in QIDS-SR scores [(56-43)/43=30%]. The participants who received TILS to the right forehead once a week for four weeks showed a significantly greater reduction of depressive symptoms than participants who received sham-placebo. Participants reported no adverse effects. While Deprexis alone significantly reduced depression scores in the placebo control group, this beneficial effect was augmented with the addition of TILS as an adjunct therapy. Further research pairing neuroenhancement methods such as TILS with cognitive interventions may reveal the potential to improve treatment outcomes in depression and other psychiatric disorders.

ID 149 - ENVIRONMENTAL DNA DETECTION OF THE ENDANGERED RIO GRANDE SILVERY MINNOW

AUTHORS: Julianne Bullock[1]; Matthew A. Barnes[1] (1. Texas Tech University)

ABSTRACT

Declining water availability and other anthropogenic and climate effects threaten multiple fishes in the Rio Grande, with an estimated 62% of all native fish currently categorized as rare or extirpated. For example, the federally Endangered Rio Grande Silvery Minnow (RGSM; Hybognathus amarus) occupies just 7% of its historic range, limited to a 174-mile reach around Albuquerque, New Mexico. Sensitive detection tools provide critical information to guide

successful conservation and management. Genetic material shed into the environment, often sloughed off cells in waste, is referred to as environmental DNA (eDNA) and can be collected and analyzed to detect species presence, offering a sensitive and rapid method for species detection. Therefore, we designed a species-specific, digital PCR assay for RGSM. To assess the performance of this assay, we collected water from captive population tanks to assess effectiveness of the assay in lab, and sampled water at locations (n = 5) along the upper confirmed range of the RGSM, specifically targeting different water structures (e.g., backwaters, woody debris) at each site. eDNA analysis offers a unique opportunity to detect RGSM in areas where traditional methods like seining are less feasible, particularly in the upper reaches of the Rio Grande, where it is not known if populations have been extirpated or persist at low levels.

ID 150 - SPECIES SORTING AND DISPERSAL EFFECTS ON HYPORHEIC INVERTEBRATE FUNCTIONAL GROUPS IN THE LOWER CANYONS OF THE RIO GRANDE

AUTHORS: Benjamin Hutchins[1]; Zoey Chanin[1]; Kathryn Perez[2]; Pete Diaz[3]; Benjamin Schwartz[1] (1. Texas State University; 2. UTRGV; 3. Fish and Wildlife Service)

ABSTRACT

The hyporheic zone (where surface water and groundwater mix in unconsolidated sediments beneath and adjacent to surface rivers), plays a critical role in river processes ranging from stream metabolism to flow regulation. It also contributes directly to stream diversity as habitat for a variety of taxa and indirectly by promoting persistence of species that utilize the hyporheic zone as refuge during drought and flood. The hyporheic zone provides an interesting opportunity to study the relative importance of dispersal and species-sorting within a species-poor but functionally heterogeneous community that varies considerably in dispersal ability and distributional patterns. In this study, we surveyed the Lower Canyons of the Rio Grande / Rio Bravo del Norte to investigate environmental and spatial factors influencing the occurrence and distribution of two functional groups: epigean taxa and stygobionts (groundwater-obligate taxa). Sampling occurred at 16 spring (via drift nets) and 28 hyporheic (Bou-Rouch sampling) sites along a 109 km reach of the river. Sampling resulted in 43,086 individuals across 73 taxa. Concordance analysis revealed two distinct communities: one dominated by epigean insects, and another dominated by crustaceans and soft-bodied organisms including stygobionts. Insects responded to environmental variables (e.g., temperature, dissolved oxygen), and did not exhibit spatial autocorrelation, suggesting species sorting, while subterranean taxa responded to spatial variables (e.g., proximity to springs and groundwater upwelling zones) and exhibited spatial autocorrelation, suggesting spatial effects. Both patterns are consistent with expectations based on life histories of these distinct functional groups.

ID 151 - LANTHANIDE ALKALI METAL SULFATES, $MLN(SO_4)_2(H_2O)_x$, VIABLE CANDIDATES FOR NUCLEAR WASTE MATRICES?

AUTHORS: Ralph Zehnder1 (1. Angelo State University)

ABSTRACT

In f-element chemistry, lanthanides are widely used as non-radioactive analogs for studying the chemistry of highly radioactive actinides due to their similar ionic radii and chemical behavior in the trivalent state. To advance this approach, we have expanded our library of lanthanide coordination polymers, establishing protocols that can later be applied to synthesize trivalent transuranium compounds. In recent hydrothermal syntheses, we obtained a series of lanthanide alkali metal sulfates, $MLn(SO_4)_2(H_2O)_x$, where M = K, Rb, Cs; Ln = Pr, Nd, Sm; and X = 0 or 4. These compounds exhibit low water solubility, indicating potential applications as stable matrices for nuclear waste storage. This presentation will focus on the structural properties of these lanthanide sulfates.

ID 153 - STRUCTURAL REARRANGEMENTS IN LANTHANUM GLUTARATE BROMOTHEREPHTHALATE,

$LA_2(GLUT)_2(TPBR)(H_2O)_4 \cdot 4H_2O$, INITIATED BY DRYING

AUTHORS: Ralph Zehnder[1] (1. Angelo State University)

ABSTRACT

We developed a synthetic approach for producing a series of isomorphous lanthanide glutarate (glut) bromoterephthalate (TPBr) coordination polymers with the formula $Ln_2(Glut)_2(TPBr)(H_2O)_4 \cdot 4H_2O$ (Ln = La, Ce, Pr, Nd). This work builds on our previous findings with isomorphous frameworks, focusing on their structural responses to ambient drying conditions. Single crystal X-ray diffraction analyses revealed that the Ce, Pr, and Nd compounds retained their original structure post-drying, while the La-analog uniquely underwent a structural rearrangement. Herein I will compare the structural properties observed for the unexpected La-specific rearrangement with the ones routinely found for the other analogs.

ID 159 - EFFECTS OF TRANSCRANIAL INFRARED LASER STIMULATION ON BRAIN RHYTHMIC ELECTRICAL ACTIVITY AND COGNITIVE AGING

AUTHORS: Isabelle Rose[1]; Dariella Fernandez[1]; Laura Gamboa[1]; Hunter Dutkiewicz[1]; Sarah Diaz[1]; Roger Davis[1]; Gabriela Guimaraes[1]; Douglas Barrett[1]; Francisco Gonzalez-Lima[1] (1. University of Texas at Austin)

ABSTRACT

Cognitive decline in aging populations presents an urgent health challenge, with non-invasive treatments like transcranialinfrared laser stimulation (TILS) showing early promise. As the U.S. population of older adults rapidly grows, the prevalence of dementia is expected to increase proportionally, imposing significant strain on the healthcare system. TILS, a key form of transcranial photobiomodulation, modulates mitochondrial respiration and increases oxygenated hemoglobin levels, ultimately supporting brain health and resilience. Both single and repeated weekly treatments have demonstrated improvements in executive function, attention, and reaction time. In this study of older adults, we investigated TILS as an intervention against neurocognitive aging. Using whole-head quantitative electroencephalography (EEG), we showed that TILS increases brain activity in the alpha and beta wave frequencies, suggesting potential protective effects on cognitive health. While previous studies on young adults show that TILS increases alpha and beta power in frontal and parietal regions, this study addresses the gap in understanding TILS effects on older adults. Although no significant group-level cognitive effect was found after a single TILS session, we observed a significant moderating effect of systolic blood pressure and LDL cholesterol on cognitive (Trails B) performance in the TILS group. This suggests that older adults with poorer cardiovascular health may experience fewer benefits. These findings advance our understanding of the electrophysiological and cardiovascular mechanisms by which photobiomodulation may support cognitive function. Overall, these findings support TILS as a promising non-pharmacological intervention to enhance cognition and quality of life in aging adults, with repeated sessions likely needed for optimal benefits.

ID 164 - DOES TAXONOMY REALLY MATTER? USING FUNCTIONAL TRAITS TO PREDICT AQUATIC INSECT PRESENCE UNDER ALTERED HYDROLOGIC CONDITIONS

AUTHORS: Hayden Hays[1]; Matthew A. Barnes[1] (1. Texas Tech University)

ABSTRACT

Functional diversity, as opposed to taxonomic diversity, can provide new insights into ecosystem health, especially in dynamic systems that undergo frequent hydrologic shifts (e.g., wetlands and springs). Unfortunately, these ecosystems face myriad threats due to their isolation, heavy reliance on shade cover, and inputs from precipitation or groundwater. This places a large burden on the aquatic taxa that inhabit ephemeral ecosystems, yet these communities remain some of the least studied. Invertebrates possess numerous functional traits that regulate their ability to persist in such harsh conditions (e.g., winged adult forms, ability to diapause), so we used an artificial pond

experiment to examine the effects of functional diversity on the presence and dispersal of aquatic insects in a semi-arid region of Texas. To simulate altered hydrologic conditions, we allowed some ponds to dry and fill naturally (n=12), whereas other ponds were maintained at a constant water level (n=12). Throughout 2023, we measured insect colonization within the pond network and paired our taxonomic data with a suite of 18 functional traits that relate to presence and dispersal (determined through an extensive literature search). Using functional analyses, our results demonstrate clear shifts in aquatic insect presence under different water permanence scenarios. As climate change alters water distribution and permanence, we expect to see a mismatch between insect emergence and the presence of water across the landscape, which could drastically hinder aquatic and terrestrial ecosystems. Our work represents a call to action for the identification of critical aquatic habitats and increased water conservation efforts.

ID 169 - ADAPTING AN OPEN-SOURCE SYRINGE EXTRUDER TO PHOTOCROSSLINK SOFT HYDROGELS

AUTHORS: Joseph Dorsey[1]; Amanda Mejia[1]; Angel Rodriguez[1]; Sabrina Woodward[1]; Domenic Cordova[2]; Cody Crosby[1] (1. Southwestern University; 2. University of Texas)

ABSTRACT

Bioprinting is an emerging field in tissue engineering and regenerative medicine that adapts 3D printing technologies to deposit soft, cell-compatible materials for complex tissue structures. However, commercial bioprinters' high-cost and proprietary nature has limited accessibility for many labs. To address this, we developed the Enderstruder—an affordable, open-source syringe extruder compatible with Ender series 3D printers, providing a flexible and cost-effective alternative to more expensive commercial counterparts. We improved the Enderstruder by incorporating UV photo-crosslinking, a crucial step for solidifying photosensitive bioinks such as GelMA and HAMA. We powered the UV (~365 nm) LEDs through the printer's mainboard, with control via open-source slicing software. By repurposing the cooling fan settings in Cura, light intensity and timing are easily adjustable, with LEDs positioned to maximize crosslinking efficiency. We also adapted the Enderstruder to accommodate a 2.5 mL gastight Hamilton syringe, ideal for precise bioink extrusion and the fragmentation of solid hydrogels for granular extrusion. These design improvements showcase the Enderstruder's versatility and effectiveness while supporting various syringe sizes while maintaining ease of use and cost-effectiveness. This enhanced functionality offers laboratories a powerful, low-cost bioprinter capable of complex biological scaffolding for labs interested in bioprinting without high financial barriers. As UV crosslinking capabilities are further refined, this open-source bioprinter could become a competitive alternative to commercial models, expanding access to advanced bioprinting technology for researchers across disciplines.

ID 171 - ABDOMINAL PHOTOBIOMODULATION (PBM) AS A THERAPEUTIC INTERVENTION FOR AUTISM SPECTRUM DISORDER (ASD): IMPACTS ON MITOCHONDRIAL FUNCTION AND GUT HEALTH

AUTHORS: Gabriela Guimaraes[1]; Sarah Diaz[1]; Nicole Jackson[1]; Nisarg Vshah[1]; Douglas Barrett[1]; Francisco Gonzalez-Lima[1] (1. University of Texas at Austin)

ABSTRACT

The human gut contains a complex ecosystem of bacteria, with the largest population in the distal gut, significantly influencing overall health. Alterations in gut microbiota are increasingly recognized as influential in autism spectrum disorder (ASD) and other neurodevelopmental conditions with gastrointestinal involvement. Dysbiosis, or microbial imbalance, has been linked to neurodevelopmental disorders like ASD, highlighting a critical role of the gut-brain axis. Photobiomodulation (PBM) is an emerging, non-invasive therapy that uses low-level laser light to improve mitochondrial function. While transcranial PBM has been explored as a cognitive intervention, the potential of abdominal PBM to impact mitochondrial function and gut health in ASD remains under-investigated. Here we evaluate the effects of PBM administered to the right lower quadrant of the abdomen with 1064 nm light at 250 mW/cm 2 for 10 minutes, targeting mitochondrial and microbial dysfunction and in a sample of children and adolescents with ASD. Research suggests mitochondrial dysfunction in ASD may impair energy metabolism,

impacting both brain function and gastrointestinal health through the gut-brain axis. Key metrics will include mitochondrial function markers, gut microbiota composition changes, and neurocognitive assessments analyzed pre- and post-PBM intervention. This study aims to investigate whether abdominal PBM can enhance mitochondrial function and alter gut microbiota in individuals with ASD, potentially improving their cognitive health and overall well-being. By examining this innovative approach, our research underscores abdominal PBM's potential as a novel, non-invasive intervention for dysfunction of the gut-brain axis in ASD and other related neuro-gastrointestinal disorders.

ID 175 - INVESTIGATING MALE PREGNANCY IN GULF PIPEFISH USING SCANNING ELECTRON MICROSCOPY TO DESCRIBE THE ANATOMY OF THE BROOD POUCH OVER THE REPRODUCTIVE CYCLE

AUTHORS: Jennifer Schmalz[1]; Deanna Soper[1]; Sunny Scobell[2] (1. University of Dallas; 2. Southwestern University)

ABSTRACT

One of the most unique forms of male parental care is seen in the Syngnathidae family (seahorses, pipefishes, and sea dragons): during reproduction, the females will deposit their eggs into the male's brood pouch to be fertilized and gestated. Recent studies have focused on understanding the function of the brood pouch using molecular techniques. However, very little is known about the anatomical morphology of the brood pouch and how it changes throughout pregnancy. The brood pouch is known to be a dynamic organ; this gap in knowledge between the morphology and molecular function makes it difficult to draw generalized conclusions about the evolution of male pregnancy. Our goal was to lay the groundwork for understanding the molecular data being collected by systematically going through and describing the anatomy of the different parts of the brood pouch through the various stages of pregnancy. Using SEM imaging, we described the anatomy of the brood pouch epithelium. In early pregnancy, the brood pouch epithelium grows up and around the embryos, increasing the surface area of the embryo and brood pouch contact. Three main structures were discovered: apical pores, ionocytes, and foot processes. The apical pore and foot processes were only seen during early pregnancy, and the ionocytes were more prevalent in non-pregnant and late-pregnant males. The function of these new structures contributes to deepening our understanding of the brood pouch and embryo interface. These data assist in our understanding of this unique sex-role reversal and will help us gain insight into reproductive evolution.

ID 181 - TRANSCRANIAL INFRARED LASER STIMULATION (TILS) IMPROVES IMPULSE CONTROL IN ADULTS WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER (ADHD)

AUTHORS: Farzad Salehpour[1]; Douglas Barrett[1]; Anagh Mirji[1]; Ayla Farzamnia[1]; Vikas Burugu[1]; Francisco Gonzalez-Lima[1] (1. The University of Texas at Austin)

ABSTRACT

Attention-deficit/hyperactivity disorder (ADHD) is a heritable neurodevelopmental disorder affecting 4.25% of U.S. adults. Impulsivity, a core symptom of ADHD, contributes to challenges in decision-making. Neuroimaging studies show reduced hemodynamic response in the right prefrontal cortex (PFC) of ADHD participants during response inhibition tasks. Transcranial infrared laser stimulation (TILS) is a non-invasive neuromodulation technique that enhances PFC metabolic activity. This study investigated the effect of a single TILS session on impulse control in adults with ADHD. Eligible participants (>18 years) with a history of ADHD diagnosis, either on stable medication or not taking medication, were randomly assigned to active TILS (n=25) or sham (n=27). Participants completed tasks assessing response inhibition (continuous performance task, CPT) and working memory (2-back task) before and after 8 minutes of active TILS or sham targeting the right PFC. A three-way ANOVA revealed a significant interaction ($\eta^2p=0.083$, $p<0.05$) among pre-/post-TILS phase, TILS treatment, and ADHD medication on total correct rejections in the CPT. These findings suggest a synergistic effect of TILS with psychotropic medications in reducing impulsivity. The Mann-Whitney U test showed significant differences in 2-back task total correct rejections ($p=0.040$) and total false alarms ($p=0.028$). The active TILS group showed greater improvements in response accuracy and inhibitory

control than the sham group. This novel randomized clinical trial expands on our prior work by focusing on adults with ADHD and demonstrates improved cognitive control following a single TILS session. TILS should be further investigated as an ADHD intervention, particularly in combination with psychotropic medication and multi-session protocols.

ID 184 - IMPACT OF SOIL MICROALGAE ON OLIVINE WEATHERING

AUTHORS: Layla Jackson[1]; Lauren Bomer[2]; Betsy Leverett[1]; John Hooker[1]; Alakananda Chaudhuri[1] (1. University of the Incarnate Word; 2. University of Texas at Austin)

ABSTRACT

The accumulation of CO2 in the Earth's atmosphere plays a major role in contributing to global warming and subsequent climate change. The development of effective carbon dioxide (CO2) sequestration strategies is critical in limiting global warming caused by greenhouse gases. One natural negative feedback mechanism for the sequestration of carbon dioxide in Earth's atmosphere is the application of powdered minerals, particularly silicates, to agricultural soils for enhanced silicate weathering (ESW) and improved soil health and crop yield. While several reports have examined soil carbon storage with and without mafic rock alterations, few reports have quantitatively examined ESW in the presence of soil microalgae and its impact on the dynamics of soil microbes. In this study, the interaction between olivine and a selection of soil microalgal species and their impact on the dissolution of crushed olivine have been evaluated. Microalgal soil persistence and microbial diversity were examined in six-week pot culture experiments with and without the addition of crushed olivine rock powder amendment. The microwave-assisted digestion of soil and the inductively coupled plasma optical emission spectroscopy (ICP-OES) method were validated and applied in the analysis of the Mg and Ni content in soil and compared with that of control olivine in the absence of microalgae to evaluate olivine weathering. Remarkable persistence of soil microalgae in soil was observed over the experimental period, as well as moderate increases in microbial diversity of carbon usage. The findings of this study are presented to support further evaluation of microalgae as CO2 sequestration enhancing agents.

ID 190 - THE PHYSICS OF SANDCASTLES: JAMMED GRANULAR COLUMNS WITH AND WITHOUT FLUID

AUTHORS: Jeffrey Olafsen[1]; Oliver-Denzil Taylor[2]; Mihan McKenna Taylor[3]; (1. Baylor University; 2. ECS Southeast, LLC; 3.US Army Engineer Research and Development Center)

ABSTRACT

Understanding how porous structures become rigid and retain their strength or fail over variable saturation rates is crucial for designing materials with targeted performances under different processing conditions, the development of materials with time-dependent viscosities and the emerging science of manipulatable advanced geo-metamaterials. Nowhere are these issues more ubiquitous than in the physics of sandcastles. A wide variety of geotechnical, engineering, and physics studies have focused on the granular materials of different particle sizes and shapes for a variety of fluid saturations. These studies can be used to describe on a case-by-case basis the physical characteristics, such as shear wave and p-wave velocities, that are dominated by either the response of the granular material or the interstitial fluid matrix. What is lacking is a more universal description of the granular+fluid system, here in its jammed state, that can predict macroscopic parameters such as strength and stability. We present a low-dimensional "phase space" model that outlines the contributions to relative strength and stability of a jammed granular column at different fractional fluid saturations as determined from prior bulk studies. While the model does not include higher order effects (spatial or temporal dependence of the parameters), it allows a granular temperature to be defined which allows the strength and stability of the column to be distinguished for a full range of fluid saturations. The model's success can be shown for two drastically different granular media: fine, nearly monodisperse, smaller grains and coarse, more polydisperse, larger grains.

ID 193 - INCREASED SALINITY SUPPRESSES DIVERSITY OF COLONIZING INVERTEBRATES IN A FIELD MESOCOSM EXPERIMENT

AUTHORS: Kale Humphries[1]; Hayden Hays[1]; Matthew A. Barnes[1] (1. Texas Tech University)

ABSTRACT

Aquatic ecosystems face accelerating threats from habitat degradation, introduction of non-native species, and salinization. Nevertheless, these habitats provide critical refugia for many macroinvertebrates that spend a portion or most of their lives in the water (e.g., insects, crustaceans, and mollusks). Aquatic invertebrates contribute to healthy ecosystems through nutrient cycling and providing a crucial food resource for both aquatic and terrestrial biota. Aquatic macroinvertebrates can also serve as bioindicators for a range of environmental conditions because they are highly sensitive to environmental changes. Therefore, understanding the environmental drivers of invertebrate colonization and establishment in aquatic systems is critical to their conservation and management. To explore the impact of salinization on freshwater invertebrate colonization and establishment, we constructed an array of pond mesocosms at the Texas Tech Native Rangeland property. Twelve replicate mesocosms each included locally sourced soil substrate, well water, and artificial aquatic vegetation. Additionally, we used aquarium salt to establish low (~1,000 ppm), medium (5,000–7,000 ppm), and high (~10,000 ppm) experimental salinities. Over 7 months, we identified 14 unique macroinvertebrate species colonizing our mesocosms. Preliminary results suggest that increased salinity suppressed diversity and abundance of colonizing invertebrates. As aquatic systems become increasingly salinized by climate change and urbanization, aquatic macroinvertebrate communities and the ecosystem services they provide may suffer.

ID 198 - PREDICTING CHEMICAL RESPIRATORY SENSITIZERS WITH MACHINE LEARNING QSAR MODELS

AUTHORS: Kiera Griffin[1]; James Liu[2]; Taylor Jefferis[1]; Joshua Peeples[3]; Christie Sayes[1] (1. Baylor University; 2. Johns Hopkins University; 3. Texas A&M University)

ABSTRACT

Respiratory sensitizers are a class of chemicals that induce an immune response, which may result in negative impacts on the respiratory system. Each exposure to a respiratory sensitizer triggers the immunological response and increases the severity of induced effects, leading to long-term health concerns such as occupational asthma. Current tests to determine respiratory sensitization are time-consuming, expensive, and unstandardized. Therefore, more efficient and reliable prediction methods must be developed. This research aims to employ machine learning models to predict the sensitization ability of a chemical based on its properties. A list of known sensitizers and non-sensitizers was taken from the literature, and a set of molecular descriptors was calculated for each chemical. These descriptors were used in six different binary classification algorithms, whose performances were analyzed across various cross-validation metrics. The multilayer perceptron method yielded the highest quality results, with a maximum accuracy of 97% and 0.94 F1 score, but also had the longest computation times. Logistic regression (maximum accuracy 86%; F1 score 0.77) and gradient boosted trees (maximum accuracy 85%; F1 score 0.76) also performed well with a significantly reduced runtime. The use of machine learning models to expedite the assessment of potential respiratory sensitizers has been shown to be useful. However, further testing must be completed to increase the models' accuracy and recall and ensure maximum performance across the diverse chemical structures that respiratory sensitizers possess. Overall, this work improves hazard identification by recognizing potential new chemical and particle sensitizers through advanced modeling techniques.

ID 199 - USE OF ddRAD SEQUENCING TO DIAGNOSE CRYPTIC SPECIES WITH LOW INTERSPECIFIC MITOCHONDRIAL DIVERGENCE

AUTHORS: Halle Summers[1]; Loren Ammerman[1] (1. Angelo State University)

ABSTRACT
Sister species that have diverged from each other recently can appear similar morphologically but typically have genetic features that can distinguish them. In the case of two sympatric species of bat (Myotis californicus and M. ciliolabrum) that are cryptic, they can be distinguished by features of their echolocation call, but no genetic marker has been discovered that can easily distinguish them. A simple diagnostic genetic marker, like a DNA sequence barcode, would assist researchers to characterize the presence or absence of these species from wing punches or fecal pellets from a roost without the need to collect the bat. Despite research on their mitochondrial genome from specimens across their range, a barcoding approach does not work for this complex. We tested the hypothesis that these two species are genetically distinct using a genomic approach. We used reduced representation genome sequencing (ddRAD-seq) to identify and analyze single nucleotide polymorphisms (SNPs) from individuals of M. californicus (n=20) and M. ciliolabrum (n=22). We will determine if the SNP panel will be able to diagnose the two currently recognized cryptic species through cluster and network analyses. Our data will be explored as a possible molecular tool that could be used to screen DNA samples and identify these two species.

ID 200 - DIRECT PARTIAL OXIDATION OF METHANE TO METHANOL USING DIOXYGEN OVER SUPERHYDROPHOBIC MODIFIED CATALYSTS

AUTHORS: Oluchukwu Igboenyesi[1]; Frederick MacDonnell[1] (1. The University of Texas at Arlington)

ABSTRACT
Direct oxidation of methane to methanol is one of the holy grails of modern chemical catalysis as this process will reduce flaring of methane and enable conversion of vast reserves of natural gas into high energy density liquid fuel, methanol. Liquid methanol is easy to transport, store, and has an appreciable gravimetric (20MJ/kg) and volumetric (15MJ/L) energy density. In this work different metals and metal oxide catalysts (Ni, NiO, CoO, Pd, Cu, CuO) co-impregnated with CeO 2 on alumina Al 2 O 3 and SiO 2 supports were explored for low temperature direct methane to methanol conversion. The potentials of the catalysts for direct methane to methanol conversion was explored under different conditions such as hydrophobic and hydrophilic modifications, temperature variations, steam variations, time on stream, inlet gas flow rate and CH 4 :O 2 ratio variation.

Superhydrophobic modified NiO-Ce/Al 2 O 3 (PF-NiO-Ce/Al 2 O 3) shows the best potential for DMTM conversion and demonstrated superhydrophobic behavior with a contact angle greater than 150 o and a sliding angle less than 10 o . PF-NiO-Ce/Al 2 O 3 being the most active catalyst has a methanol productivity of 298 umol.g -1 Ni .h -1 while the hydrophilic NiO-Ce/Al 2 O 3 has a lower productivity of 35 umol.g -1 Ni .h -1 in the presence of steam. In the absence of steam, only trace amount of methanol was produced while the major product was CO 2 . Increasing steam flow to 0.333Sccm increases the productivity of methanol but deactivates the catalyst faster.

ID 202 - FORAGING HABITAT AND BEHAVIOR OF MEXICAN LONG-NOSED BATS IN BIG BEND NATIONAL PARK, TEXAS

AUTHORS: Flor Calderon[1]; Loren Ammerman[1] (1. Angelo State University)

ABSTRACT
Identifying foraging habitat is essential for understanding a species' ecology and guiding conservation strategies. This study focuses on Leptonycteris nivalis
(Mexican long-nosed bat), a migratory and nectarivorous bat listed as federally endangered. This species relies on Agave havardiana as a food source in the Chisos Mountains of Big Bend National Park, Texas, where the only known maternity roost exists in the United States. In summer 2024, GPS tracking was used to identify core foraging areas of 12 adults and 9 juveniles. We hypothesized that both adults and juveniles would forage redominantly where A. havardiana is abundant, with juveniles potentially exploring larger areas. Adults generally traveled shorter distances from the roost and spent less time in flight compared to juveniles. High-elevation foraging clusters were observed,

particularly within the Chisos Basin and primarily within 8 km of the roost. The mean adult home range was 8,968.6 ha (SD ± 23,868.2), while juveniles averaged a larger home range of 49,735.5 ha (SD ± 94,578.6), likely due to more exploratory movements. Core ranges (60%) averaged 34.8 ha (SD ± 76.3) for adults and 43.7 ha (SD ± 91.0) for juveniles. Additionally, some individuals ventured as far as the Sierra del Carmen, suggesting possible undiscovered roosts. Maximum flight distances of over 255 km and speeds of 73 km/h were recorded, underscoring this species' high mobility. These findings are crucial for habitat preservation and restoration efforts, especially as L. nivalis populations face threats from climate change and habitat loss.

ID 208 - EXPLORING NATIVE WEST TEXAS PLANT EXTRACTS FOR ANTI-HEMOLYTIC PROPERTIES: POTENTIAL NATURAL REMEDIES FOR RED BLOOD CELL PROTECTION AND INFLAMMATION

AUTHORS: Atlanta Williams[1]; Sui Tial[1] (1. The University of Texas Permian Basin)

ABSTRACT

Hemolysis, when red blood cells break down too quickly, can happen for all sorts of reasons like autoimmune diseases or even infections. When this happens, hemoglobin is released into the bloodstream, which can cause anemia, fatigue, and damage to organs. Finding natural ways to help with this process, like plant-based remedies, is advantageous.

Here in this study, we will study a plant native to West Texas, which might help with hemolysis. Our research will look for native plant extracts that have anti-hemolytic properties, meaning they could help reduce the breakdown of red blood cells, especially under oxidative stress. Upon research, plants are shown to be beneficial for inflammation and infections; but there is not as much research on plant support for blood health.

Native plant extracts will be obtained using an organic solvent. Hemolytic bacteria, including alpha- and beta-hemolytic types, will be exposed to the extracts on blood agar plates to observe changes in hemolysis. Bacteria like *Streptococcus pneumoniae* (alpha) and *Streptococcus pyogenes* (beta) show distinct patterns: partial lysis with a green tint for alpha, and complete lysis with a clear zone for beta. Reduced hemolysis on treated plates would suggest anti-hemolytic effects. Liquid blood cultures will further test if the extracts can limit bacterial growth or hemolysis under stress.
If successful, this study could reveal native plants with dual benefits, potentially showing anti-inflammatory properties and helping protect red blood cells from breakdown. This opens up many possibilities for using native plants in natural treatments for hemolysis and related issues.

ID 216 - GRANULAR HYDROGEL SYNTHESIS FOR AN IN VITRO HYDROGEL MODEL OF BRAIN PARENCHYMA TISSUE

AUTHORS: Amanda Mejia[1]; Joseph Dorsey[1]; Noor Nazeer[1]; Nicole Hislop[1]; Sabrina Woodward[1]; Cody Crosby[1] (1. Southwestern University)

ABSTRACT

Treatments for neurological disease have been limited by the selectivity of the blood-brain barrier (BBB). Studying BBB physiology and pathology in the laboratory has required the use of in vivo models or the biofabrication of brain organoids, which are expensive and limited in scale and biomimicry. As an alternative approach, our lab seeks to fabricate a hydrogel that mimics the physical and chemical characteristics of the BBB. We hypothesize that using fragmented microgels will create a microporous hydrogel scaffold that will support cell viability and exhibit a low complex modulus. We specifically focused on synthesizing sub-millimeter fractured microgels that could be jammed to form an extrudable bioink. We incorporated gelatin methacryloyl (GelMA), methacrylated hyaluronic acid (HAMA), PEGDA, and PLGA nanoparticles to create this biomimetic hydrogel. Varied concentrations of the added components were mixed with a photoinitiator (LAP), enabling the fluid mixture to crosslink with UV light and result in solid

viscoelastic hydrogels. We dissolved each component separately and then mixed the four components from least to most viscous using a piston pipette. The fluid mixture was crosslinked in a plastic syringe and then fractured with four needle gauges of decreasing diameter. A replicable procedure introducing fracturing to the hydrogel synthesis was designed and validated and resulted in a stabilized hydrogel for further testing while printing with the Allevi 1 and Enderstruder bioprinter.

ID 221 - EFFECTS OF TRANSCRANIAL PHOTOBIOMODULATION ON SYMPTOMS OF AUTISM SPECTRUM DISORDER

AUTHORS: Sarah Diaz[1]; Gabriela Guimaraes[2]; Nicole Jackson[2]; Nisarg Vshah[2]; Roger Davis[1]; Douglas Barrett[2]; Francisco Gonzalez-Lima[1] (1. University of Texas, 2. University of Texas at Austin)

ABSTRACT

Autism spectrum disorder (ASD) is a highly prevalent neurodevelopmental condition characterized by impairments in social interaction and communication, repetitive behaviors, and restricted interests. These impairments are often accompanied by difficulties with sustained attention and impulsivity, which can profoundly affect quality of life and daily functioning. Transcranial photobiomodulation (tPBM) is a form of non-invasive brain stimulation that utilizes low-level, near-infrared light to upregulate mitochondrial bioenergetics. In healthy and clinical populations, tPBM targeting the right prefrontal cortex (PFC) has improved cognitive functions such as attention, working memory, impulsivity, and emotional regulation. As there is strong evidence that mitochondrial dysfunction plays a key role in the pathophysiology of ASD, targeting the right PFC via tPBM has the potential to ameliorate cognitive and behavioral symptoms of ASD. Previous studies have demonstrated beneficial effects of tPBM on ASD, however, research is in the incipient stage. In this proof-of-concept study, we examined the effects of 10-minute daily tPBM treatment sessions administered to the right PFC over an eight-week period in children, adolescents, and adults with ASD. Participants completed questionnaires and underwent cognitive testing before and after eight weeks of tPBM treatment. Weekly check-ins monitored safety, side effects, and assessed subjective responses to treatment. Results showed decreases in autistic traits and symptom severity, with overall positive reported responses to treatment, improved sustained attention, and decreased impulsivity. These findings support the potential of tPBM as a new promising low-risk, accessible, and alternative intervention for reducing ASD symptom severity and mitigating deficits in cognitive function. Supported by Vanguard Charitable.

ID 224 - MICROWAVE GRAPHITIZATION OF BIOCHAR CATALYZED BY FERRIC NITRATE

AUTHORS: Jessica Villarreal (The University of Texas Permian Basin)

ABSTRACT

Biomass is an effective and low-cost method for preparing carbon-based materials through microwave pyrolysis. Graphite, known to be a great conductor of heat and electricity due to its unique physical structure, has been of high necessity for its various implementations in renewable energy and industrial applications including batteries, solar panels, automotive, and lubricants. Graphite can conduct electricity with a determined degree of graphitization. As such, this study aimed to increase the degree of graphitization in biochar for future applications. Ferric Nitrate, which acts as a catalyst, helps biochar reach a certain degree of graphitization. Biomass underwent microwave pyrolysis in three different powers: 350W, 420W, and 450W. Raman Spectroscopy was utilized to analyze the samples to determine the degree of graphitization of biochar.

ID 225 - LIES AND DECEPTIONS OF THE TRAVELING SALESMAN

AUTHORS: Paul Feit (University of Texas Permian Basin)

ABSTRACT

The Traveling Salesman Problem (TSP) starts with a complete graph, each of whose edges is assigned a weight. The ``pure'' challenge is to find a Hamiltonian circuit whose total cost (defined as the sum of weights of its edges) is minimal. A practical version is to find an algorithm that has a good chance of producing a circuit of ``reasonable'' cost.

The problem can be taught in an elementary course that plays with graphs. Simple algorithms, based on selection of cheap edges, require little theory or machinery. But, comparative sizes of costs are easy to corrupt!

This introduction introduces simple ways to change weights. It then asks: is it worth effort to tweak weights as we preform steps within a common algorithms?

ID 226 - TOWARDS A UNIVERSAL FORMAT FOR EXERCISE CONSTRUCTION

AUTHORS: Paul Feit (University of Texas Permian Basin)

ABSTRACT

Teachers constantly reuse questions. Normally, the situation is copied and component values (or, in story questions, names) changed. Technology makes reproduction easy. However, there remain problems of scale.

\begin{itemize}

\item Code for a specific type of exercise is easily created using many desk-top languages. Many macro languages suffice. However, software for one genre may not adjust easily for another.

\item Powerful programs are often proprietary. They can be edited but only within guidelines set by the developer.

\item An operating system upgrade may be incompatible with a system of exercises already in place.

\end{itemize}

{\em Standardization\/} allows LaTeX and HTML to circumvent these issues when they arise in formatting.

A LaTeX document is simply text. As long as programs are available to interpret that text by established rules, LaTeX code can be shared and reused, even as software evolves.

The speaker has toyed with this concept for exercises. Can one set standards such that a framework for problems need only be saved as text with codes phrases? If a framework is widely accepted, then using the framework merely requires obtaining software, on any system, that uses those codes.

Something becomes ``standard'' only when a wide audience accepts it. In this lecture, the speaker hopes to raise interest. He will illustrate concepts, methods and gaps discovered in his experimentation.

ID 228 - INTEGRATING GENERATIVE AI INTO UNDERGRADUATE BIOLOGY COURSES FOR ENHANCED LITERATURE REVIEWS AND SCIENTIFIC WRITING

AUTHORS: Susan Klinedinst (Schreiner University)

ABSTRACT

As artificial intelligence becomes increasingly influential in research and education, leveraging AI tools in undergraduate science courses offers unique opportunities to enhance student learning and engagement. This presentation will explore an innovative approach for guiding students through the literature review and scientific writing processes in a biology course using generative AI tools, including ChatGPT, Elicit, and Litmaps. Integrating these tools into structured assignments helps students overcome common barriers in research, such as navigating complex scientific terminology, identifying relevant sources, and mapping relationships between studies. Preliminary results indicate that this AI-assisted approach increases student engagement and improves the depth and organization of literature reviews. Discussion will include the pedagogical benefits and ethical considerations of incorporating AI tools into the curriculum, as well as practical insights from student feedback. This presentation offers a framework that educators can adapt to help students develop essential research skills and gain familiarity with AI's evolving role in scientific inquiry.

ID 229 - RILL MARKS ON THE BEACH FACE AT MCFADDIN NATIONAL WILDLIFE REFUGE, TEXAS

AUTHORS: R. LaRell Nielson (Stephen F. Austin State University)

ABSTRACT

Well-developed rill marks are present on the beach face at McFadden Beach along the southern margin of McFaddin National Wildlife Refuge, Texas. These rill marks are produced as the tide goes out and water drains 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 a higher concentration of fossil fragments and a smaller amount of clay. Below each permeable zone, the sand contains fewer shell fragments and larger amounts of clay resulting in the zone being less 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: fringy, conical, branching, meandering, and bifurcating. All five types of rill marks are found on the beach face at McFaddin National Wildlife Refuge, Texas. 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 during stormy days with high tides. Preservation and recognition of rill marks in the rock record is low, because the next high tide destroys the rill marks that developed during the last low tide.

ID 236 - EXPLORING THE IMPACT OF SALINITY LEVELS ON FOOD CONSUMPTION IN THE INVASIVE CRAB SPECIES, RHITHROPANOPEUS HARRISII

AUTHORS: Samantha Hamilton[1], Terrence Boyle[1] (1. McMurry University)

ABSTRACT

The relationship between environmental salinity and food consumption in the invasive mud crab, Rhithropanopeus harrisii , affecting ecosystems through predation and competition, was investigated. One hundred specimens were collected from Hubbard Creek Lake, then separated by size and sex across six tanks. Crabs were exposed to varying salinities (5 to 30 ppt), with a group weight measured at each level to determine food consumption as salinity changed. T-tests were used to compare average weights across salinity levels to identify significant differences between male and female experimental tanks. The statistical analysis shows that no statistically significant difference in average weight was observed between male and female groups across salinity levels, as none of the calculated T-scores exceeded the critical value of 12.706 for statistical significance. These findings suggest that R. harrisii can adapt to a broad salinity range without significant variation in food consumption, highlighting its resilience and potential ecological impact in diverse environments.

ID 237 - AQUAPONICS IN EDUCATION: UTILIZING A SUSTAINABLE PLATFORM FOR STEM EXPLORATION

AUTHORS: Alice Conely[1]; Matthew Allen[1] (1. Wayland Baptist University)

ABSTRACT

Aquaponics is a method of growing plants and fish together in an efficient and compact system that mimics some aspects of a natural aquatic environment. It is an increasingly popular food production system due to its scalability, efficiency, and reduced environmental impacts. In educational settings, aquaponics offers a dynamic, hands-on platform for engaging students in STEM learning. It facilitates the exploration of topics in biology, ecology, environmental science, agriculture, chemistry, physics, math, and engineering, fostering problem-solving and inquiry-based learning. In early 2024, Wayland Baptist University installed an aquaponics system in their greenhouse, becoming a focal point for student learning and research for all ages. In this presentation, we will discuss how the design and operation of aquaponic systems provide a wide variety of opportunities to inspire STEM exploration and deepen students' understanding of interconnected scientific concepts.

ID 238 - DETECTING LEPTONYCTERIS NIVALIS AT EMORY CAVE USING AIRBORNE eDNA

AUTHORS: Ashley Loehn[1]; Loren Ammerman[1] (1. Angelo State University)

ABSTRACT

Leptonycteris nivalis is an endangered species of bat known to seasonally occupy Emory Cave in Texas. Although this species' endangered status necessitates regular monitoring, disturbances by researchers may have a negative impact on bats. In recent years, it has been shown that it is possible to collect environmental DNA (eDNA) from the air in order to characterize terrestrial vertebrate communities with minimal disturbance, but little is known about airborne eDNA sampling in a natural setting. Our aim was to use airborne eDNA samples from Emory Cave to evaluate eDNA retention inside a bat roost and use metabarcoding to characterize the vertebrate community inside the cave. We found eDNA from five bat species, three non-bat mammal species, and two bird species known to use the habitat around the cave. Our results suggest that the amount of eDNA recovered varies based on the length of time since last occupation by the target species and the placement of samplers within the roost. We were able to detect L. nivalis DNA inside the cave over 100 days after the bats had vacated, demonstrating the extreme sensitivity of this method. These results indicate that airborne eDNA sampling can provide useful information about cave-roosting species, particularly if used in conjunction with other monitoring methods, but secondary transfer and contamination from humans and domestic animals must always be considered. We recommend further research into the environmental factors that affect airborne eDNA retention and collection in a cave environment.

ID 247 - A MULTIMODAL APPROACH FOR RESOURCE ALLOCATION DURING NATURAL DISASTERS

AUTHORS: Agafia Bowden[1]; Dipak Singh[1] (1. Stephen F. Austin State University)

ABSTRACT

Social media analysis provides disaster response teams near-real-time insights into damage severity, community sentiments, and specific resource needs. Given the rapidly changing conditions on the ground, effective resource allocation remains a significant challenge. To address this, our study proposes a machine learning framework that utilizes social media data for immediate, need-based categorization over time. We use the BERT transformer model to classify Twitter posts into seven categories— shelter , water/food , medical , rescue , road damage , other , and unrelated —and map these to locations extracted from the social media posts. Unlike most research that uses social media to address disaster response, this study uses a multimodal approach that integrates image and socioeconomic data into the machine learning pipeline, accounting for biases in social media that may underrepresent vulnerable groups. This is crucial, since resource allocation based on a biased analysis could exacerbate existing inequalities. An open-source natural disaster image dataset is used to train a model for assessing damage severity, while FEMA's National Risk Index is integrated to evaluate Census tract-level vulnerabilities in Houston, TX. The primary data source is a large set of Twitter posts from Hurricane Harvey. Datasets such as Harris County flood gauge data and displacement figures from the Texas Flood Registry are used to assess the accuracy of our model's output. The aim of this research is to improve upon current ML approaches to disaster informatics and rapid response by integrating diverse data sources and accounting for local vulnerabilities.

ID 248 - EXPLORING THE MORPHOLOGY, GEOGRAPHY AND PHYLOGENY OF A FAMILY OF BLINDSNAKES (ANOMALEPIDIDAE: SERPENTES)

AUTHORS: Camilo Linares[1]; Christopher Bell[2]; Claudia Koch[3]; Matthew Heinicke[4]; Hussam Zaher[5]; Juan D. Daza[1] (1. Sam Houston State University, 2. The University of Texas at Austin, 3. Leibniz Institute for the Analysis of Biodiversity Change, 4. University of Michigan-Dearborn, 5. Museum of Zoology of the University of São Paulo, São Paulo, Brazil)

ABSTRACT

Anomalepididae is a small family of miniaturized snakes distributed in the Neotropics. Anomalepididae was

previously classified with other families of blind snakes and thread snakes, however, recent molecular analyses have retrieved Scolecophidia as paraphyletic, and Anomalepididae as the sister group of Alethinophidia. We studied the anatomy of the skull of virtually all the species using micro-CT data and high-density three-dimensional geometric morphometrics. The resulting morphospace recovers two major disjunct clades, with one clade distributed mainly in northwestern South America and Central America, and the other in southeastern South America. That pattern is also recovered with a preliminary molecular phylogeny using 16s and COI genes on 34 species of Scolecophidia. A complete phylogeny is underway, but morphological data, including the presence or absence of supraoccipital bone, support the existence of these two groups and require some taxonomic changes.

Finally, snake origins are controversial, particularly whether derived from terrestrial, aquatic, or subterranean ancestors. An important question in snake evolution is whether there was a transition from fossorial to superficial habitats; for this reason, anomalepidid snakes are important because they offer a rare representation of snakes that dwell between these environments today.

ID 249 - COMPUTATIONAL INSIGHTS INTO NITROGEN ACTIVATION CHEMISTRY UTILIZING CHALCOGEN BONDING INTERACTIONS

AUTHORS: Kirk French[1]; Surya Choutipalli[1]; Kevin Shuford[1] (1. Baylor University),

ABSTRACT

Herein, we investigate the activation of nitrogen gas (N 2) using chalcogen bond (ChB) donating molecules paired with an iron organometallic complex. Complete geometry optimizations and harmonic vibrational frequency computations are performed on each monomer and corresponding complex with the PBE0 density functional in conjunction with empirical dispersion (D3) and a triple-ζ Pople basis set augmented with diffuse functions on all atoms excluding H with one set of p polarization functions on H and two d sets an all other atoms (6-311+G(2d,p)). In this study, an N 2 molecule is activated through a polarizing complex with an electron-donating metal complex on one nitrogen atom and a ChB donor on the other to polarize the nitrogen molecule. Various electron-withdrawing substituents are bonded to the ChB donor to evaluate the effect of ChB donor strength on the activation process. Obtained data and results that elucidate nitrogen activation chemistry and assist in improving the N 2 activation processes will be discussed.

ID 250 - HABITAT SELECTION IN THE GLOBULAR DROP SNAIL HELICINA ORBICULATA IN EAST TEXAS WATERWAYS USING GIS DATA

AUTHORS: Alexander Bell[1]; Nicholas Negovetich[1]; Ben Skipper[1] (1. Angelo State University)

ABSTRACT

The presence of plants and animals susceptible to pollution, chemical waste and agricultural runoff in an environment, commonly known as bioindicator species, may be used as an inexpensive and consistent metric to measure biodiversity and health of an ecosystem. Gilled freshwater snails such as Helicina orbiculata are especially vulnerable to changes in their environment and are abundant in East Texas, where recent changes in infrastructure have produced varying levels of pollution in Texas waterways. This study aims to show that the presence of H. orbiculata can be used to indicate the health of freshwater environments in Eastern Texas waterways. Preliminary results utilizing GIS data on surface water quality and photo-verified citizen observations indicate a high level of discrimination in habitat selection for H. orbiculata as well as the air breathing pulmonate snail Physa acuta . These data indicate that there is differential usage of habitats available to these snails. This differential use was then analyzed using GIS data on land cover, agricultural use, soil impermeability, and proximity to wastewater disposal facilities to further illuminate factors related to habitat selection. This study is anticipated to provide future ecological and conservation efforts in Texas waterways with additional metrics in order to measure the health and diversity of these ecosystems.

ID 254 - LONGITUDINAL STUDY OF WHITE BAND DISEASE IN ACROPORA SPECIES IN ROATÁN, HONDURAS

AUTHORS: Ethan Villa[1]; Deandre Rosales[1]; Kylee Steiger[1]; Stephanie Randell[1]; Stephanie Lockwood[2]; Traesha Robertson[3]; Jacqueline Dove[1] (1. McLennan Community College; 2. Texas Tech University; 3. College of Coastal Georgia)

ABSTRACT

White Band Disease (WBD) was first recorded in 1979 and has caused a 95% decline in Acropora spp. The 3-D structure of Acropora spp. provide shelter for many reef organisms and their loss has adversely affected Caribbean reef health and is expected to degrade the ecosystem further. In Roatan (2014), 73% of A. cervicornis were diseased with WBD. This study assessed the prevalence and coverage of WBD in Acropora species on the Mesoamerican Reef in Roatan, Honduras in May 2023 and 2024. From 2023 to 2024, total A. cervicornis increased 4% (p-value = .02) but decreased for A. palmata by 12% (p-value = .013). In 2023, 58% of A. cervicornis were diseased; average disease coverage was 35%; 87% was WBD type 2. In 2024, 19% of A. cervicornis were diseased; average disease coverage was 12%; 100% was WBD type 1. Disease frequency for A. cervicornis decreased by 67% (p-value = .135). In 2023, for A. palmata: 16% were diseased; average disease coverage was 26%; 67% with WBD type 1. In 2024, no diseased A. palmata were observed. Coral area and disease coverage for A. cervicornis, decreased by 76% and 66%; and for A. palmata by 57% and 100%, respectively. These data suggest a trend toward smaller, but less diseased Acropora spp. Changes for A. cervicornis may reflect the active out-planting from coral nursery programs in Roatan. We anticipate this study to be ongoing to continue to monitor changes to Acropora health in the Bay Islands.

ID 260 - EVERY AMINO ACID MATTERS, BUT SOME MATTER MORE: INSIGHTS FROM POPULATION-WIDE HISTONE MISSENSE MUTATION LANDSCAPE

AUTHORS: Dustin Fetch[1]; Tiffany Bastos[1]; Natalie Redding[1,] Ksenia Dydo[1], Gauri Raje[1], Alexey Soshnev[1] (1. The University of Texas at San Antonio)

ABSTRACT

Core histone proteins are encoded by dozens of paralogous genes. This complicates the interpretation of the biological significance of histone missense mutations frequently observed in malignancies and developmental disorders, as a single allele contributes only a fraction of total protein. Several dominant “oncohistone” alleles represent a notable exception, where a single copy is sufficient to inactivate a “writer” enzyme upon incorporation. However, the vast majority of histone mutations in disease remain difficult to interpret.

We predicted that critical variants will be absent in the missense variant landscape in healthy population – thus allowing us to refine the true “driver” mutations in disease and uncover biologically significant residues. To this end, we analyzed germline histone alleles reported in Genome Aggregation Database (gnomAD4.1), revealing both entirely invariant residues, and patterns in missense variants suggesting yet-uncharacterized dominant mechanisms.

We reasoned that any lysines that do not tolerate M/I substitutions represent likely targets of SET methyltransferases with critical developmental function. Out of 58 lysine residues in core histones where codon structure permits a K>M/I substitution from a single nucleotide change, 31 do not tolerate either of these variants. Absence of M/I variants in this subset of lysine residues suggests that these represent likely targets of SET domain methyltransferases in vivo , with a critical role in development. Remarkably, no “writers” or “readers” of methylation are reported for many of these residues, offering a starting point for new investigations into the biologically significant histone modifications.

ID 267 - EVALUATING THE WATER QUALITY OF TREATED WASTEWATER FROM DEEP EAST TEXAS WASTEWATER TREATMENT PLANTS USING MICROBIAL BIOFILM

AUTHORS: Olabisi Ogunlewe[1]; Bidisha Sengupta[1] (1. Stephen F. Austin State University)

ABSTRACT
Efficient wastewater treatment (WWT) is essential for sustaining clean water resources, promoting environmental sustainability, and ensuring community health and safety. This study evaluates the water quality of treated wastewater using microbial biofilm as a key indicator. WWT processes include primary (mechanical), secondary (biological), and tertiary (chemical) treatments that effectively remove pollutants, contaminants, and pathogens to meet quality standards. Despite these treatments, microbes are found to form biofilms in this treated water, creating concerns to water quality. Biofilms are aggregates of microbial cells encased in an extracellular matrix. In this research, treated wastewater samples were collected from San Augustine and Nacogdoches counties, along with sterilized deionized (ST) and tap water (TW) collected from the laboratory, to assess their interaction with Bacillus thuringiensis (Bt) for biofilm formation. Bt was grown overnight in liquid Luria Broth (LB) at 37ºC with shaking and an optical density (OD at 600 nm) of 0.03 was used to initiate biofilm formation. Bt was incubated in various environments, including 100% LB and LB mixed with water samples at a 50%:50% v/v ratio in multi-well culture plates for 24 hours under static conditions. After incubation, optical spectroscopy, ion chromatography, and imaging studies were performed to assess biofilm formation. The OD of the supernatant indicates biofilm formation, while brightfield images reveal vertical growth, and scanning electron microscopy shows the biofilm's surface structure. Ion chromatography highlights anion effects, with bacteria absorbing phosphate and chloride excretions correlating to biofilm stability. Further studies on mitigating biofilm formation using nanoclusters and phytochemicals are underway.

ID 268 - CHARACTERIZATION OF A POTENTIAL NEW SPECIES OF THE WILDFLOWER GENUS ANEMONE

AUTHORS: Kricket Tolbert[1]; Russell Pfau[1] (1. Tarleton State University)

ABSTRACT
More than 150 species of perennial herbs make up the genus Anemone , with five of those species occurring in Texas: A. caroliniana , A. berlandieri , A. tuberosa , A. edwardsiana , and A. okennonii . Recently, specimens of this genus have been found that are phenotypically unique compared to the known species and may represent an undescribed species. These specimens exhibit a unique combination of characteristics including pattern of hairs on the stem, bract morphology, leaf division, and flower morphology. This potential new species has been documented in northwest Texas, western Oklahoma, and southwestern Kansas where it partially overlaps with the more widely distributed species A. berlandieri without evidence of hybridization. Here we document the phenotypic and genetic differences between the five known species of Anemone and the potentially undescribed species. We extracted DNA from each of the five species of Anemone known to occur in Texas plus representatives of the potential new species. We amplified a portion of the nuclear ITS gene using polymerase chain reaction (PCR) and sequenced the resulting PCR products using automated Sanger sequencing dideoxy chain termination sequencing. We constructed a phylogenetic tree to determine the patterns of genetic divergence among these six species. The data observed from this research will broaden our understanding of biodiversity in Texas, therein informing proper conservation and management decisions by state, federal, and private conservation agencies

ID 271 - COMPREHENSIVE INSIGHTS INTO MOSQUITO SPECIES DIVERSITY AND HABITAT-SPECIFIC HOST SELECTION PATTERNS TO ENHANCED SURVEILLANCE OF VECTOR-BORNE PATHOGENS IN CAMERON PARK ZOO, WACO, TEXAS.

AUTHORS: Dhivya Rajamanickam[1]; Jason Pitts[1] (1. Baylor University)

ABSTRACT
A major factor in female mosquitoes' transmission of pathogens is their blood meal host preference. Therefore, understanding female mosquitoes' feeding patterns is key to predicting the mosquito-borne disease transmission cycle and assessing the potential risk of disease outbreaks in human and animal populations. Zoos are a nexus for interactions between exotic and indigenous animals and people, which directly affected the introduction and spread

of the West Nile virus in the United States. In this study, we collected mosquitoes throughout 2024 and 2023 at Cameron Park Zoo in Waco, Texas, using species-specific mosquito traps, including BG-Lure traps, Gravid traps, and BG-Pro light traps. The central hypothesis is that the diversity of host species may influence mosquito host-seeking behavior, potentially altering viral transmission dynamics and allowing non-target species to serve as reservoir hosts. We then identified mosquito species and their blood meal hosts using DNA barcoding while attempting to uncover multiple host-feeding analyses. Our results indicate mosquitoes in this public space utilize a broad range of hosts, including domestic and exotic mammals and birds. This study provides valuable insights into mosquito behavior and disease risks in similar environments and can serve as a baseline for future studies at this site and across the state. To enhance mosquito surveillance, conventional odor-baited trapping methods will be combined with next-generation sequencing and multiplex PCR to identify mosquito species, determine host feeding preferences, and test for the presence of West Nile virus and avian protozoan parasites, which will aim to reduce the impact of vector-borne diseases.

ID 273 - THE EFFECTS OF VARIABLE NUTRIENT STOICHIOMETRY ON BIOGEOCHEMICAL PROCESSES IN SHALLOW LAKE MESOCOSMS

AUTHORS: Alexa Hoke[1]; Isabelle Andersen[1]; Jason Taylor[2]; Katelyn McKindles[1]; Thad Scott[1] (1. Baylor University; 2. USDA National Sedimentation Laboratory)

ABSTRACT

Anthropogenic nutrient loading into freshwater systems can have significant impacts on ecosystem function. The application of fertilizer in agricultural settings can increase the relative amount of nitrogen (N) compared to phosphorus (P) entering freshwater systems during runoff events. How these potential stoichiometric imbalances influence microbial communities and associated biogeochemical processes remains poorly studied. We assessed the impact of stoichiometric extremes on the sediment-water interface during a fertilization experiment conducted in twelve experimental limnocorrals located in three ponds at the University of Mississippi Field Station in Abbeville, Mississippi. During the sampling seasons of 2019, 2020, and 2021, the limnocorrals were fertilized to target N:P (molar) ratios of 2.2, 16, 55, and 110. These open-bottomed mesocosms allowed for biogeochemical exchange with the sediments. In August of 2021, sediment cores were collected from each limnocorral as well as the surrounding ponds. Sediment cores were used in a flow through incubation experiment to measure N2 flux in the sediment water interface. The first centimeter of sediment was analyzed for total N, C, and P. DNA was also extracted and whole genome metagenomic sequencing was performed. N2 flux data suggests that N fixation occurred in the sediment water interface of the 2.2 and 16 N:P treatments. Total N, C, and P in the first centimeter of sediment were significantly lower in the ponds compared to 16 N:P treatments. Despite few differences in the sediment nutrient composition between most treatments, we expect to see differences in microbial community composition and functional potential between N:P treatments.

ID 276 - LONGITUDINAL STUDY OF WHITE BAND DISEASE IN ACROPORA SPECIES IN ROATÁN, HONDURAS

AUTHORS: Ethan Villa[1]; Deandre Rosales[1]; Kylee Steiger[1]; Jacqueline Dove[1]; Traesha Robertson[2]; Stephanie Lockwood[3]; Stephanie Randell[1] (1. McLennan Community College; 2. College of Coastal Georgia; 3. Texas Tech University)

ABSTRACT

White Band Disease (WBD) was first recorded in 1979 and has caused a 95% decline in Acropora spp. The 3-D structure of Acropora spp. provide shelter for many reef organisms and their loss has adversely affected Caribbean reef health and is expected to degrade the ecosystem further. In Roatan (2014), 73% of A. cervicornis were diseased with WBD. This study assessed the prevalence and coverage of WBD in Acropora species on the Mesoamerican Reef in Roatan, Honduras in May 2023 and 2024. From 2023 to 2024, total A. cervicornis increased 4% (p-value = .02) but decreased for A. palmata by 12% (p-value = .013). In 2023, 58% of A. cervicornis were diseased; average disease

coverage was 35%; 87% was WBD type 2. In 2024, 19% of A. cervicornis were diseased; average disease coverage was 12%; 100% was WBD type 1. Disease frequency for A. cervicornis decreased by 67% (p-value = .135). In 2023, for A. palmata : 16% were diseased; average disease coverage was 26%; 67% with WBD type 1. In 2024, no diseased A. palmata were observed. Coral area and disease coverage for A. cervicornis , decreased by 76% and 66%; and for A. palmata by 57% and 100%, respectively. These data suggest a trend toward smaller, but less diseased Acropora spp. Changes for A. cervicornis may reflect the active out-planting from coral nursery programs in Roatan. We anticipate this study to be ongoing to continue to monitor changes to Acropora health in the Bay Islands

ID 277 - SYNTHESIS OF AER-270 PRODRUGS TO INHIBIT AQUAPORIN-4 USING CONTROLLED-RELEASE KINETICS

AUTHORS: Akhil Kumar Sarkar[1]; Michael Nicosia[2]; Anna Valujskikh[2]; Bob Kane[1] (1. Baylor University; 2. Cleveland Clinic),

ABSTRACT

Our group has been developing strategies for localized drug delivery in transplants for several years. It has been reported that the Aquaporin-4 inhibitor AER-270 and its more soluble phosphate prodrug AER-271 improve outcomes in murine cardiac tissue grafts, lower the risk of cardiac tissue damage, decrease T cell proliferation and cytokine production, and mitigate post-transplant ischemia-reperfusion injury (IRI). Our group developed AER-270 prodrugs functionalized for localized distribution to take advantage of the compound's distinct mode of action and also address the poor pharmacokinetic properties. We will present our progress in synthesizing and characterizing AER-270 prodrugs, which can be delivered with controlled kinetics in a physiological environment. These prodrugs have different substitutions utilized to alter the kinetics of drug release and use a methylene bridge spacer attached to the AER-270 phenol oxygen connected to a tether for bioconjugation. Studies of these AER-270 prodrugs show a wide variety of accessible drug-release half-lives.

ID 283 - N-SULFONYLATION OF CARBAMATES UNDER MILD CONDITIONS

AUTHORS: Claire Slort[1]; Rahul Gaykar[1]; Bob Kane[1] (Baylor University)

ABSTRACT

Compounds possessing one or more sulfonyl groups represent a significant class of therapeutic agents due to their unique physicochemical properties. The incorporation of a sulfonyl group can modulate the solubility and acid-base characteristics of drug or prodrug molecules, enhancing their overall pharmacological profile. Moreover, sulfonyl groups can act as hydrogen bond acceptors, providing two potential sites for hydrogen bonding, and ultimately can improve the binding affinity of drug molecules to their target proteins via hydrogen bond interactions. As polar functional groups, sulfonyl groups can increase the polarity of drug or prodrug molecules, which may help to mitigate off-target effects. Due to the relevance of sulphonyl group, it is important to develop a mild strategy to introduce sulfonyl group into small molecules for structure-based medicinal chemistry. Separately, carbamates serve as structural or functional components in many drugs and prodrugs approved and marketed for the treatment of diverse diseases such as; Cancer, Hepatitis C, Epilepsy, HIV, and Alzheimer's disease. Considering the importance of sulphonyl group and carbamates in drug discovery and medicinal chemistry we developed a mild strategy for the N -sulphonylation of carbamates using mild conditions. Notably, the general method for N -sulphonylation of carbamates is not known in the literature to the best of our knowledge. Our results on method development for N -sulphonylation of carbamates, substrate scope, and applications will be discussed in the presentation.

ID 284 - SYNTHESIS AND CHARACTERIZATION OF A WATER-SOLUBLE TAK-242 PRODRUG

AUTHORS: Jacquelin LaBerteaux[1]; Bob Kane[1] (Baylor University)

ABSTRACT

Tak-242, which is a small molecule inhibitor of TLR4, has shown great promise in applications of various inflammatory diseases, but it suffers in application and research due to its limited aqueous solubility. Many studies have shown that a polyethylene glycol (PEG) moiety can be utilized to improve the water solubility of drugs and prodrugs. In previous studies in our lab, we utilized a small PEG moiety, tetraethylene glycol, in our TAK-242 derivatives. However, even with this small PEG group added, our TAK-242 derivatives still exhibited solubility issues. In this study, we synthesized a TAK-242 prodrug that contains a β-eliminative arylsulfone trigger, para-aminobenzyl spacer, and a medium length PEG moiety (avg 550 Da). Preliminary qualitative data has shown improvements in the solubility of this prodrug at HPLC concentrations. Further experimentation is planned to more accurately characterize the properties of this compound, including the increase in solubility. Overall, this synthesis and pegylation strategy has produced a TAK-242 prodrug with improved solubility, and work is ongoing to demonstrate the potential of these compounds.

ID 285 - MICROPLASTICS IN WASTEWATER TREATMENT PLANTS OF DEEP EAST TEXAS

AUTHORS: Jacob Swallow[1], Kefa Onchoke[1] (1. Stephen F. Austin State University)

ABSTRACT

Microplastics (MPs) are emerging pollutants of growing global concern. MPs cause health hazards to humans and the environment. Wastewater treatment plants (WWTPs) serve as secondary sources for MP contamination in the environment. The physical and chemical characteristics of MPs from four Deep East Texas WWTPs were investigated using bright-field optical microscopy, scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FTIR) and SEM/Energy dispersive X-ray spectroscopy (SEM/EDX)) techniques. The most common shapes of MPs were found in the order: fragments (396 ± 181 MPs/L) > filaments (131 ± 102 MPs/L) > rods (52 ± 58 MPs/L) > beads (17 ± 29 MPs/L) > fibers (17 ± 44 MPs/L). MPs were more abundant in smaller size ranges (≤150 µm (600 ± 300 MPs/L)) than larger size ranges (150 µm ≤ x ≤ 850 µm (215 ± 433 MPs/L)). FTIR spectra indicates the presence of polyvinyl chloride, polypropylene, polytetrafluoroethylene, nylon, and polyvinyl acetate. Via fast map analysis, high concentrations of carbon in SEM/EDX spectra indicate the presence of MPs. Concentrations of oxygen and/or chlorine, when paired with a high concentration of carbon, can give an indication of the chemical composition of MPs. Many WWTPs discharge treated water into nearby creeks and streams. Thus, WWTPs contribute to the release of MPs into the aquatic and terrestrial environments. The ubiquity of MPs in the environment can pose risks and impact the functions of plants, animals and humans leading to a significant public health concern.

ID 287 - SYNTHETIC EFFORTS TOWARDS NOVEL PRODRUGS OF TAK-242 (RESATORVID) FOR LOCALIZED IMMUNOSUPPRESSION

AUTHORS: Rahul Gaykar[1]; Bob Kane[1] (1. Baylor University)

ABSTRACT

Transplantation can be a lifesaving treatment for patients suffering from a various diseases and disorders. Our lab has a focus on improving success in the transplantation of pancreatic islets by developing a localized drug delivery system to protect the transplant tissue while minimizing off-target side effects. Toll like receptor 4 has been identified as a major mediator for graft inflammation and dysfunction after organ transplantation, making it a therapeutic target for improving graft survival post-transplant. The sulfonamide drug TAK-242 has been identified as a potent TLR4 signaling inhibitor. We previously demonstrated the protection of transplanted pancreatic islets by the covalently conjugation of potent prodrugs of TAK-242 to islet surfaces, which then release the active drug after transplant. These first-generation TAK-242 prodrugs were linked to islets via an azide tether for bioconjugation and with an aryl sulfone β -elimination trigger for drug release. Although these prodrugs did release TAK-242 and protect the islet tissue in a murine transplant model, the vinyl sulfone linker residue, which can undergo a Micheal addition with N and S nucleophiles under physiological conditions, was retained on the islet surface. To mitigate this problem

we are currently working on the development of new prodrugs of TAK-242 with self-immolative traceless linkers. This new TAK-242 prodrug is designed to exhibit predictable rates of drug release but to not leave residual linker on the islet surfaces nor produce vinyl sulphones as a side product. Our synthetic efforts towards these novel TAK-242 prodrugs will be presented.

ID 289 - WHAT A GTA WANTS: TRAINING AND PROFESSIONAL DEVELOPMENT REQUESTS BY GRADUATE TEACHING ASSISTANTS IN STEM

AUTHORS: Chloe Sells[1]; Michelle Herridge[1] (1. Baylor University)

ABSTRACT

In large research universities, hundreds of graduate students may serve as teaching assistants (GTA's) across campus. While job responsibilities are fairly consistent between courses and departments, the training provided to the GTA is often widely variable. As part of university-wide changes to GTA training and development at a large, public, established R1 institution, we had the opportunity to explore requests, compliments, complaints, and suggestions from the GTA's themselves in planning new training materials. Expanding this research to a private institution that recently achieved R1 status, we solicited additional feedback from GTA's on what training they received, what they wish they had received, and overall how to better support them. In this talk, we will discuss the findings and the requests from GTA's, in particular from those in the STEM fields, and give examples on how to better support GTA's across campus.

ID 290 - AN EASY AND COMPREHENSIVE PROTOCOL FOR MICROINJECTION INTO ZEBRAFISH (DANIO RERIO) AND MEDAKA (ORYZIAS LATIPES) EGGS TO STUDY GENE FUNCTION

AUTHORS: Alicia Mendoza[1]; Isabella Simon[1]; Sharmin Hasan[1] (1. Sam Houston State University)

ABSTRACT

Mastering the microinjection technique is essential for understanding gene function in developmental biology research. Among the teleost fish, zebrafish (Danio rerio) and Japanese rice fish (Oryzias latipes) are popular and powerful vertebrate model organisms for microinjection procedures. We developed a comprehensive protocol with detailed instructions for successful breeding and microinjection techniques in fertilized zebrafish and medaka eggs. Our protocol details the meticulous crafting of customizable glass needles using a micropipette puller, ensuring precision and consistency in delivering microinjection solutions into fertilized eggs. To achieve uniform distribution and optimal results it is crucial to administer microinjection solutions into the blastomeres at the 1-to-2-cell stage. Alternatively, solutions can be injected into the yolk cytoplasm of zebrafish embryos for efficient intracellular distribution. By following this protocol, any microinjection solution components, such as DNA/RNAs, plasmids, proteins, or toxins, can be successfully administered into the blastomeres or yolk to achieve targeted and consistent results. This guide is applicable for a wide variety of microinjection solution components, which is demonstrated here by characterizing the role of a gene, dennd5b during the early embryonic development of zebrafish and medaka. We compared the phenotypes of an uninjected control, a standard control morpholino (oligonucleotide), a translation-blocking gene-specific anti-sense morpholino for dennd5b , and dennd5b-specific mRNA overexpression using our microinjection protocol to gain valuable insights into the functional analysis of genes in zebrafish and medaka embryos. Our protocol will serve as a versatile tool for the study of embryogenesis and organogenesis by microinjection.

ID 292 - FUNCTIONAL STUDY OF PROFILINS USING A VERTEBRATE MODEL

AUTHORS: Samira Alam[1]; Andre Gil[1]; Leslie Mendez[1]; Sharmin Hasan[1] (Sam Houston State University)

ABSTRACT

The profilin gene family is an ancient and widespread group of genes found across both prokaryotes and eukaryotes. There are 172 paralogous and orthologous profilin genes in various life forms. Profilin's primary function is promoting

actin polymerization, a process crucial to maintaining cell shape, movement, and division. Disruption of profilin influences various types of pathologies, such as spinal muscular atrophy, diabetes, vascular hypertrophy, and hypertension. Zebrafish (Danio rerio) contains four paralogous profilins, z pfn1, z pfn2a , zpfn2b and z pfn4 . However, the roles of these paralogues are only partially studied during early embryonic development. We are characterizing the expression and function of these paralogous profilins in zebrafish embryos employing RT-PCR, mRNA overexpression, morpholino-mediated knockdown, and CRISPR-Cas9 knockout techniques. Our RT-PCR results showed a persistent expression pattern of zpfn1 and zpfn2a at 0, 3, 5, and 24 hours of embryonic development, whereas zpfn2b and zpfn4 showed no expression. A morpholino-mediated knockdown of zpfn2a caused no significant phenotypic changes suggesting the other paralogue, zpfn1 may play a critical role in the development. To validate our knockdown results and gain insights into the zpfn1 and zpfn2a function by CRISPR/Cas9-mediated gene editing, we designed two short guide RNAs targeting zpfn1 and zpfn2a by selecting target sequences in exon with optimal PAM, GC content, and low off-target profiles. Alongside, we are now conducting gain-of-function studies of zpfn1 and zpfn2a by cloning the full-length Open Reading Frame (ORF) into expression vectors, and synthesizing mRNAs for overexpression into zebrafish embryos by microinjection.

ID 299 - SPATIOTEMPORAL CHARACTERIZATION OF MICROPLASTIC POLLUTION IN TWO URBAN EPHEMERAL SYSTEMS

AUTHORS: Andre Felton[1]; Sue Ellen Gibbs-Huerta[1]; Beauxregard Martinez[1]; Salem Farner[1]; Briaunna Zamarripa[1]; Cristina Mendez[1]; Oscar Hernandez[1] (University of Texas San Antonio)

ABSTRACT

Microplastic pollution has been reported across aquatic, marine, and terrestrial environments and presents an environmental concern as one of the fastest growing sources of pollution. Rivers are recognized as major unilateral pathways of MP transport between terrestrial and marine ecosystems, yet our understanding of their dispersal patterns over space and through time as they migrate from source to sink is limited. Furthermore, freshwater microplastic studies have largely focused on perennial rivers with little attention to intermittent rivers and ephemeral streams. In this study, Surface water and sediment samples were collected monthly from 24 sites along two urban ephemeral rivers (Leon Creek and Salado Creek) in San Antonio between June 2021 and May 2022 to characterize and evaluate the spatiotemporal distribution of microplastics. Microplastics were found in all sites throughout monitoring timeframe. Fibers were the most abundant (~82%) morphology followed by foams (11%). The abundance of microplastics varied from 17 items to 1459 items/cm 3. Potential MPs were marked and analyzed using Fourier Transform Infrared Spectroscopy (FTIR) for confirmation and polymer identification. This study is the first to report microplastics in ephemeral streams. As the global extent of IRES systems is projected to increase with continued climate change, understanding such systems influence on microplastic spatial distribution and fluvial transport regimes constitutes valuable information in assessing microplastics pathways and their fate as a part of the global “Plastisphere” geochemical cycle in the Anthropocene.

ID 302 - ASSESSMENT OF BIRD COMMUNITIES USING eBIRD DATA IN THE RED RIVER BASIN FOLLOWING A SIGNIFICANT WEATHER EVENT

AUTHORS: Zoe R. Williams[1]; Jessica L. Coleman[1]; Matthew J. Greenwold[1] (1. University of Texas at Tyler)

ABSTRACT

Citizen science is a fast-growing source of biological data for use in monitoring populations without the need for direct involvement. Detecting fluctuations in bird populations in response to increasingly intense weather events is vital to their conservation. However, can citizen science sources, such as eBird, be used to track the effects of extreme weather on bird populations and detect species more susceptible to the future climate crisis. Bird species found along freshwater ecosystems such as the Red River Basin are major indicators of environmental health, and many serve as keystone species of their communities. The Texas Winter Storm of 2021 was a significantly abnormal

weather event, with conditions not seen for decades. Bird species found in Texas at that time are likely not used to such low winter temperatures and snow cover, which could result in a mass mortality event and lead to a harsh dip in their populations. Using eBird data, we trimmed the dataset by only using occurrence points taken from three years before and after the event within the Red River Basin and removed potential duplicates from the dataset. Bird species were categorized into guilds based on food type and foraging behavior to evaluate trends in mortality. Community diversity metrics were performed, including richness and abundance, for the entire community and for each guild before and after the weather event. Statistical analyses were performed to detect significant differences between the bird community guild types before and after the storm.

ID 305 - UNDERSTANDING THE COMMUNITY COLLEGE TRANSFER STUDENT LANDSCAPE IN TEXAS: IDENTIFYING THE GAPS TO EMPOWER TRANSFER SUCCESS

AUTHORS: Sariah Kaipat[1]; Trinity Vig[1]; Jason Locklin[1] (1. Temple College),

ABSTRACT

Community colleges provide students affordable college credits that can be transferred to four-year institutions, significantly enhancing student's career options and economic prospects. While an associate degree from a community college provides median annual earnings 13% higher than those of high school graduates, a bachelor's degree increases earnings by 37% compared to those with only an associate degree. Despite 83% of community college students nationwide intending to transfer to a four-year institution, only 32% of them actually do. This gap is unfortunate because community college students are successful when they transfer (i.e. in 2023, 76% of Temple College transfer students persisted to their second fall semester at the university, and 66.5% graduated within three years of transferring to that university). However, only 11.6% of Temple College students transferred in 2019, similar to the statewide rate of 12.6%, which is well below the number that intended to transfer. To better understand the transfer intentions of community college students in Texas and the barriers they face, we surveyed 1,392 community college student from Temple College during the third week of the Fall 2024 semester. Among the several barriers to transferring that were identified, students highlighted the need for adequate transfer advising (including financial planning) from community college and university advisers as a critical factor needed to help close the gaps and improve transfer rates. Addressing these barriers through targeted advising and support services could significantly enhance the transfer success of community college students, ultimately leading to better educational and economic outcomes in Texas.

ID 308 - FROM CLASSROOM TO CONFERENCE: INTEGRATING UNDERGRADUATE STUDENT RESEARCH TO TRANSFORM STEM EDUCATION AT A COMMUNITY COLLEGE

AUTHORS: Jason Locklin (Temple College)

ABSTRACT

Undergraduate research experiences (UREs) have become an essential component of science education at many institutions of higher education. Research experiences provide students invaluable benefits such as understanding the research process, mastering laboratory/field techniques, analyzing data, and developing problem-solving and communication skills. Beyond this technical training, UREs also foster independence, resilience, self-confidence, evidence-based reasoning, and career exploration. Research opportunities, however, are often inaccessible to community college students due to unique challenges that many non-research, teaching institutions experience (heavy faculty teaching loads; inadequate research lab space/equipment; students lacking the course prerequisites required for research participation during their two-year tenure, etc.). Administrative support is often insufficient as well because classroom instruction is prioritized over research experiences for student learning. Temple College has developed a URE model that's accessible to all incoming community college students, including dual-credit students. Despite the challenges, Temple College's program has led to significant student success with 100% of participants who have completed and presented their research transferring to a university—a stark contrast to statewide (12.6%)

and overall, Temple College (11.6%) transfer rates. The program has also produced student co-authors on peer-reviewed publications that contribute to the discipline. The program was developed slowly but has recently been embedded into the natural sciences curriculum to ensure continued access for future students. In this presentation, I discuss some solutions to barriers and strategies we found productive to ensure we continue enhancing our student research opportunities that equip our students with critical skills while enhancing their potential to pursue STEM careers.

ID 319 - INFLUENCE OF PHYTOCHEMICALS PRESENT IN MINT EXTRACT IN PREVENTING OXIDATIVE STRESS IN HUMAN SERUM ALBUMIN

AUTHORS: Perla Tovar[1]; Nkeiruka Aziekwu[1]; Grace Murray[1]; Tess Corbett[1]; Bidisha Sengupta[1] (1. Stephen F. Austin State University)

ABSTRACT

Human Serum Albumin (HSA) is the most prevalent protein in the human body. Due to its major binding sites, HSA functions as an efficient transporter of hormones, fatty acids, and pharmaceuticals in the circulatory system. Damaging reactive oxygen species (ROS) that bind to native HSA induce toxicity by changing its conformation and function. Due to the existence of a single tryptophan (strong fluorophore) in the hydrophobic region of HSA, it is possible to study ligand binding and conformational changes in HSA using optical spectroscopy (UV/Vis and fluorescence). The present study investigates the structural alterations induced in HSA by ROS through metal-catalyzed oxidation under physiological conditions and explores the protective effects of some phytochemicals including quercetin and kaempferol – present in Mentha piperita (mint). UV/Vis absorption, steady state fluorescence, circular dichroism (CD) spectroscopy, HPLC, and gel electrophoresis were employed to carry out this investigation. Spectroscopic studies revealed that the combination of the reagents ferrous sulfate with H 2 O 2 is needed to induce oxidative stress in HSA. CD based concentration dependent studies on HSA revealed oligomers of HSA to be formed above 10 µM in aqueous solution. Moreover, with the techniques employed, significant conformational damage in HSA under oxidative stress was observed. In the presence of the individual phytochemicals, the protein's structure was retained, although to a smaller extent than when the mint and watercress extracts were applied. For future studies, synergistic antioxidative effects of multiple phytochemicals along with the juice extracts will be explored.

ID 321 - EFFECTS OF HYPOSALINITY AND NUTRIENTS ON THE GPP OF GRACILARIA TIKVAHIAE

AUTHORS: Donavuan Salazar (University of Texas Rio Grande Valley)

ABSTRACT

The seaweed Gracilaria tikvahiae has been documented as resistant to low salinities and absorbing large amounts of nutrients. Extended periods of low salinities have still been recorded as having detrimental effects on the respiration and photosynthetic rate of the seaweed. This study tracks the gross primary production of the gracilaria samples over 9 days tracking the NPP, RR, Biomass change, and nutrient uptake rate.

ID 322 - LIFE HISTORY EVOLUTION IN THE ANNUAL MENTZELIAS: SECTIONS BICUSPIDARIA AND TRACHYPHYTUM (LOASACEAE)

AUTHORS: Joshua Brokaw (Abilene Christian University)

ABSTRACT

Mentzelia is a monophyletic genus of nearly 100 species of herbs and subshrubs in the western hemisphere. Species are often ruderal or found in low-productivity environments, such as cliffs, sand dunes, and edaphically stressful substrates. Early phylogenetic reconstructions of Mentzelia recovered six major clades, which have been treated

taxonomically as distinct sections. Four of these sections are primarily perennial or biennial, whereas sections Bicuspidaria and Trachyphytum are exclusively annual species. Reconstructions show that Bicuspidaria and Trachyphytum are not sister clades, suggesting that the annual life history evolved independently in each from an ancestral perennial or biennial form. The two sections have distinct ecological strategies, with Bicuspidaria more common in hot deserts and Trachyphyum in a variety of ruderal habitats, but both groups occur primarily in southwestern North America with dry summer Mediterranean or desert climate. Furthermore, when considering diploid species alone, sections Bicuspidaria and Trachyphytum exhibit similar species richness and rates of speciation, providing an opportunity to compare consequences of the transition to annual life history. For example, the majority of species in section Bicuspidaria have flower sizes near or above the average found in Mentzelia , whereas the majority of diploid species in Trachyphytum have smaller flowers. Section Trachyphytum has evolved into an allopolyploid complex tripling the species richness of the clade, whereas Bicuspidaria exhibits sparse aneuploidy. Chloroplast introgression has been common in section Trachyphytum and nearly or completely absent in Bicuspidaria , suggesting differences in the history of homoploid hybridization and a potential explanation for contrasting patterns

ID 324 - HIDING IN PLAIN SIGHT: A COMMONLY OBSERVED AND WIDELY DISTRIBUTED NEW SPECIES OF WOLF SPIDER

AUTHORS: Russell Pfau[1]; Eric Neubauer[2] (1. Tarleton State University, 2. Unaffilated)

ABSTRACT

Wolf spiders (Family Lycosidae) are among the most abundant invertebrate predators in many ecosystems. Within Texas, there are over 80 species of lycosids. Of those, members of the genus Hogna are among the largest, with body lengths up to 35 mm. Six species of Hogna have been reported to occur in Texas. While attempting to identify wolf spiders in Texas, we noticed two distinct forms that appeared to be H. antelucana based on published species descriptions. After observing hundreds of specimens, we found consistent differences in color patterns between these two forms. We identify one form as H. antelucana and the other—a putative new species—we have been referring to as H. 'incognita' . Both forms are commonly observed and widely distributed, but H. 'incognita' has a smaller geographic distribution—occurring entirely within the distribution of H. antelucana . We have identified unique morphological features at all stages of development (from the 2nd instar to adult) and in both sexes. Additionally, we have identified differences in reproductive phenology between the two forms. Lastly, we are sequencing the mitochondrial COI gene to determine if these putative species are genetically distinct.

ID 328 - EXAMINING THE RESCUING EFFECTS OF VOLUNTARY WHEEL RUNNING ON DEPRESSIVE-LIKE BEHAVIORS AND NEUROINFLAMMATION IN A MOUSE MODEL OF HYPERGLYCEMIA

AUTHORS: Laura Kusumo[1]; Grace Summers[1]; Matthew Folh[1]; Jonathan Duhon[1]; Kaylea Gawf[1]; Elisabeth Vichaya[1] (1. Baylor University),

ABSTRACT

Diabetes is associated with an increased risk for developing depression. Emerging data suggests that this effect is, at least in part, mediated by diabetes-associated hyperglycemia increasing brain oxidative stress and neuroinflammation. While it is established that exercise plays a role in attenuating depressive-like behaviors in other models, there has been limited research investigating its efficacy in hyperglycemia-associated depression. Thus, we used a 2 (+/- STZ) by 2 (+/- exercise [EX]) design (n =5-7 mice/group) to examine if chronic exercise can rescue hyperglycemia-related affective dysfunction and inflammation levels in male C57BL6/J mice (8 weeks old). Hyperglycemia was induced through administration of 50 mg/kg/day streptozotocin (STZ) over 5 days and was defined as a fasted blood glucose exceeding 250 mg/dL. Four weeks post-STZ, mice were single-housed and voluntary running wheels (or a plastic hut for control mice) were introduced into the home cage. After six weeks of exercise, we observed an STZ by EX interaction in blood glucose levels (p =0.002) such that exercise resulted in a mild

reduction in blood glucose levels in STZ mice; however, both STZ groups remained hyperglycemic throughout the study. Our behavioral results demonstrate that STZ induced depressive-like behavior. Furthermore, we observed an exercise-related attenuation of behavioral deficits in the forced swim test and splash test. This experiment presents novel data indicating that exercise may have the ability to ameliorate depressive-like behavior independently of its ability to modify hyperglycemic levels. Tissue analyses are ongoing to evaluate inflammatory cytokines and BDNF expression within the hippocampus, cerebellum, frontal cortex, and plasma.

ID 329 - ASSESSING ANXIETY IN A ZEBRAFISH NICOTINE CESSATION MODEL

AUTHORS: Britney Castillo[1]; Ayman Hamouda[1]; Brent Bill[1] (1. The University of Texas at Tyler)

ABSTRACT

Due to nicotine's addictive nature, more than 30 million people use cigarettes, and ~9 million use e-cigarettes in the USA. This results in ~380,000 deaths annually. Pharmacological interventions (i.e. varenicline) increase the success of individuals trying to quit nicotine use; however, a disagreement about neuropsychiatric side effects including anxiety complicates their use. Zebrafish are an useful animal model to study nicotine exposure and its effects. Using the Novel Tank Test, an assay for anxiety, we assessed varenicline's impact on anxiety following the initial exposure and short-term nicotine use in wild-type zebrafish. We utilized two strains, a polygenic line (Segrest) and an isogenic line (AB) to assess differences.

We observed significant differences in behavior for both the nicotine- and varenicline-treated fish in both acute and short-term paradigms. Similar to previously published results, we observed a behavioral difference between strains for acute nicotine exposure. In contrast, we demonstrate that both strains show reduced anxiety with short-term nicotine use. Unlike nicotine, varenicline demonstrated an increase in anxiety in both strains following acute treatment, and a decrease in anxiety in the short-term nicotine use paradigm. This is the first demonstration of the effects of varenicline on anxiety in adult zebrafish and establishes a baseline for assessment of other nicotine cessation pharmaceuticals. Future work will compare the effects of other nicotine cessation agents on anxiety.

ID 333 - SYNTHESIS OF BIS-DIAMINE MONOMER TO CONSTRUCT OLIGO-BENZODIAZABOROLE-BASED MACROCYCLES.

AUTHORS: Sathsara Senarathne[1]; Javier Hodges[1]; Dustin Gross[1] (1. Sam Houston State University)

ABSTRACT

Dynamic Covalent Chemistry (DCC) is a growing discipline of chemistry that can lead to the formation of macrocycles, allowing for self-correction during cyclo-oligomerization. Previously, we have shown that diazaboroles, formed through a condensation reaction between boronic acid and vicinal diamines, can be used in the construction of oligo-benzodiazaborole-based macrocycles. Here, we have targeted a diazaborole-based macrocycle starting from commercially available resorcinol. Williamson ether synthesis followed by bromination afforded a 1,3-dibromide that under Sonogashira coupling conditions with trimethylsilylacetylene resulted in 1,5-Bis(tetradecyloxy)-2,4-bis[(trimethylsilyl)ethynyl]benzene. After deprotection of the silyl groups, the second Sonogashira reaction resulted in bis-nitroaniline compound, 1,5-Bis(tetradecyloxy)-2,4-bis[(4-amino-3-nitrophenyl)ethynyl] benzene. Using sodium dithionite as the reducing agent, successful reduction of the bis-nitroaniline was achieved with a significant yield of the desired bis-1,2-phenylene diamine monomer. In future work, the synthesized bis-diamine monomer will be subjected to a condensation reaction with various types of boronic acids to construct different oligo-benzodiazaborole-based oligomers and macrocycles. Furthermore, potential ring-chain equilibrium during the dynamic covalent oligomerization will be explored.

ID 334 - METHODICAL MICROPLASTICS: DEVELOPMENT OF AN UNDERGRADUATE CURE TO QUANTIFY ABUNDANCE OF MICROPLASTIC FIBERS IN A LOCAL STREAM

AUTHORS: Romi Burks[1]; Andre Felton[2] (1. Southwestern University; 2. University of Texas San Antonio)

ABSTRACT

Faculty often face a number of challenges in their attempts to provide high impact experiences, such as undergraduate research, for as many students as possible. One-on-one mentoring or forming even small teams within a faculty's research program often allows for in-depth, long-term experience, but only for a few students. The adoption of CUREs (course undergraduate research experiences) fills the need to provide meaningful and realistic exposure to the research process for a greater number of students at a more effective cost. Inspired by connections made at the Texas Academy of Sciences, we recently developed a CURE focused on microplastics for an intensive half-semester course (Methods in Ecology and Evolution) offered primarily to Biology majors at a small liberal arts college. The ubiquitousness of microplastics across habitats makes for an excellent model system from which students can brainstorm (at least to some extent) their own research questions and the links between local experimentation to regional and global science applications. To facilitate a shortened time period, our initial explorations at Southwestern University restricted our efforts to surface water sampling of the local San Gabriel River and enumeration of only microfibers compared to including sediment sampling and quantification or identification of additional microplastic morphotypes (i.e., fragments, foam, pellets, etc…). Students spent two class periods (each 3 hrs) in the field and another two in the lab. This presentation will illustrate the scaffolding of student learning objectives embedded in this CURE and discuss considerations necessary for incorporating such an approach within an undergraduate curriculum.

ID 336 - REDOX COOPERATIVITY ANALYSIS WITH COMPUTATIONAL CHEMISTRY: INTERPLAY BETWEEN ENERGY MATCHING AND GEOMETRIC ARRANGEMENT IN REDOX NON-INNOCENT SYSTEMS

AUTHORS: Hadley Watts[1]; John Gary[1] (1. Stephen F. Austin State University),

ABSTRACT

Multiple redox events are fundamental to chemical reactions. Most chemical processes are two-electron processes (organic arrow pushing mechanisms, resonance, and oxidative addition/reductive elimination in organometallic chemistry). Due to the frequency of this two-electron process, platinum group metals are often used in catalysis due to their ability to perform two-electron redox events. Cooperativity between multiple redox sites is ubiquitous in enzyme systems. This cooperativity allows for the use of multiple cheap Earth-abundant metals, which typically undergo one-electron redox processes, to perform multi-electron chemistry. While prevalent in enzymes, the energetic, proximity, and geometric orientation requirements to allow this cooperativity are not well understood given the diversity found in enzyme systems. Literature is focused on the electronic energy matching of redox sites to participate multi-electron redox events. Previously, our group has reported a unique property in the electronic structure of these systems in which multiple electronic configurations are remarkably close in energy. This electron fluidity appears to be a fundamental property of successful systems. This talk will highlight how electronic matching between redox sites are tied to the geometric orientation of the redox sites. This interplay is key in the design of new redox non-innocent systems.

ID 337 - A LONGITUDINAL STUDY: THE ABUNDANCE AND DISEASE STATUS OF STARLET CORALS IN ROATÁN, HONDURAS

AUTHORS: Gloria Dominguez[1]; Kaylee Aguilar[1]; Leon Rosales[1]; Annie Mowry[1]; Stephanie Randell[1]; Stephanie Lockwood[2]; Traesha Robertson[3]; Jacqueline Dove[1] (1. McLennan Community College; 2. Texas Tech University; 3. College of Coastal Georgia)

ABSTRACT
Coral reefs, which support 25% of marine life and protect shorelines, are increasingly threatened by anthropogenic climate change. Among these corals are the hermatypic starlet corals, native to the Mesoamerican Barrier Reef (MBR). Increasing water temperatures and water quality decline have led to an increase in coral disease. Two key diseases affecting starlet corals are Dark Spot Syndrome (DSS) and Stony Coral Tissue Loss Disease (SCTLD). Dark Spot Syndrome produces non-lethal lesions which weaken coral while SCTLD begins with lesions which quickly spread, causing rapid tissue decay. This study aimed to assess the abundance and disease status of starlet corals Siderastrea siderea , Siderastrea radians, and Stephanocenia intersepta on the MBR in Roatán, Honduras. From 2023 to 2024 , S. siderea had an increase in damaged corals compared to diseased (p-value = 0.016). In 2023, S. siderea 58% (n=100) were diseased; 28% were damaged; 12% were dead; 2% were healthy. For S. radians, 6% (n=16) were diseased; 69% were damaged; 25% were healthy. For S. intersepta 40% (n=5) were diseased and damaged; 20% were healthy. In 2024, S . siderea , (n=150) 19% were diseased; 74% were damaged; 4% were dead; 3% were healthy. For S. radians 10% (n=20) were diseased; 70% were damaged; 10% were dead. For S. intersepta 82% (n=17) were damaged; 6% were diseased. For all starlet corals, 6% (n=187) were diseased with SCTLD. These findings suggest that damage to starlet corals is more prevalent than disease. Future research should explore environmental factors influencing coral damage and disease.

ID 345 - AVOIDING OXIDANT DISPROPORTIONATION WITH TERT-BUTYL HYDROPEROXIDE IN IRON CATALYZED CARBON-HYDROGEN BOND OXIDATIONS

AUTHORS: Iris Christopher[1]; John Gary[1] (1. Stephen F. Austin State University),

ABSTRACT
Typical synthetic catalyst systems for hydrocarbon oxidation are most commonly based upon noble metals such as platinum, palladium, rhodium, and iridium. While these manifolds have been highly successful in aromatic sp 2 C-H bond functionalization, expansion towards alkane sp 3 C-H bonds has been much rarer. In contrast, nature employs cheap and earth abundant metals such as iron, copper, and manganese to perform impressive chemical transformations with exquisite selectivity. Using nature as an inspiration, this presentation will highlight investigations into new iron-oxo complexes for organic oxidations. Using tetradentate amine ligands, in situ catalyst preparation is used to generate a simple catalytic system with iron capable of oxidizing C-H bonds and olefinic substrates. Typically, these systems employ hydrogen peroxide as an oxidant, which is prone to the catalase side reaction of disproportionation to water and oxygen gas. In order to circumvent this disproportion, this talk will highlight the use of tert-butyl hydroperoxide as a hydrogen peroxide alternative. This oxidant modification will be discussed in regards to its effects on catalytic reactivity and oxidative efficiency.

ID 346 - CATALYST AND OXIDANT MODIFICATIONS FOR CARBON-HYDROGEN BOND OXIDATIONS

AUTHORS: Meghan Jennings[1]; John Gary[1] (1. Stephen F. Austin State University)

ABSTRACT
Model complexes of non-heme iron-oxo enzymes have been popular for the oxidation of hydrocarbon carbon-hydrogen bonds given the high activity observed in enzyme systems. Small ligand modifications in coordination number, sterics, and donor abilities can cause large modulations in chemical reactivity. While significant focus in the literature has utilized complex strategies to synthesize unique iron complexes, our recent approach has been the in situ generation of catalysts to avoid multi-step synthesis. Using tetradentate amine ligands, in situ catalyst preparation is used to generate a simple catalytic system with iron capable of oxidizing C-H bonds and olefinic substrates. This in situ generation is also highly modular which allows for simplified catalyst screening. This talk will highlight the use of tert-butyl hydroperoxide as a hydrogen peroxide substitute to avoid oxidant disproportion and its combined effect with catalyst modifications. In order to circumvent this disproportion, this talk will highlight the effect of small ligand perturbations and oxidant identity to cause modifications in oxidative efficiency for the

oxidation of carbon-hydrogen bonds.

ID 349 - HIGH-THROUGHPUT VIRTUAL SCREENING OF NEW DELHI METALLO-BETA-LACTAMASE 1 (NDM-1) IN KLEBSIELLA PNEUMONIAE LEADS TO DISCOVERY OF POTENTIAL INHIBITORS

AUTHORS: Sharon Rong[1]; Josh T. Beckham[1] (1.The University of Texas at Austin),

ABSTRACT

Carbapenem-resistant Enterobacteriaceae is a prevalent common denominator in cases of antibiotic resistance, with New Delhi metallo-beta-lactamase 1 (NDM-1) being one of many. This metal-dependent beta-lactamase found in Klebsiella pneumoniae is not currently susceptible to any of the beta-lactamase inhibitors incorporated into combination drugs used in the clinic, and its prevalence makes it an attractive target for drug discovery. This project aims to identify and characterize novel small molecule inhibitors targeting NDM-1. The NDM-1 enzyme acts upon the beta-lactam antibiotics by hydrolyzing the beta-lactam ring, disrupting antibiotic function. By inhibiting NDM-1, this hydrolysis is prevented, keeping the beta-lactam antibiotic intact. To begin discovery, a crystallography model of the NDM-1 enzyme from K. pneumoniae was pulled from the Protein DataBank and utilized for structure-based virtual screening of over 150,000 compounds via molecular docking using ICM (Molsoft) and GOLD (CCDC). Compounds with the best ICM and/or GOLD docking scores, along with adherence to Lipinski's Rule for drug discovery, were prioritized for biochemical assays in wet lab binding to NDM-1 using differential scanning fluorimetry (DSF) and inhibition assays. This protein has been expressed via autoinduction in BL21(DE3) E. coli and purified through nickel affinity, obtaining a pure, high yield protein with a melting temp of 52 degrees Celsius. Two top compounds have been tested in DSF. This methodology integrates both experimental and computational approaches in order to discover potential inhibitors of the NDM-1 enzyme. These efforts may contribute to the fight against the global health crisis of increasing antibiotic resistance.

ID 353 - BROOD POUCH ANATOMY THROUGHOUT THE COURSE OF MALE PREGNANCY IN GULF PIPEFISH

AUTHORS: Farah Atatrah[1]; Sunny Scobell[2] (1. University of Dallas; 2.Southwestern University)

ABSTRACT

Male pregnancy in syngnathid fishes, which encompasses seahorses, pipefishes, and seadragons, presents a unique opportunity to explore evolutionary adaptations in reproductive biology. We aim to investigate the anatomical aspects of the brood pouch in the Gulf pipefish, Syngnathus scovelli, over the course of male pregnancy. The brood pouch serves as a specialized structure for incubating eggs and embryos, exhibiting dynamic changes throughout the stages of pregnancy. Utilizing cryosectioning and histological staining techniques, we describe the anatomy of the brood pouch epithelium and underlying connective tissues across multiple time points during the various stages of pregnancy. Our findings reveal significant alterations in tissue morphology and organization, suggesting functional adaptations to support embryonic development. Our findings also lead us to believe that there is a mechanism of pouch closure and opening that needs to be explored more. By explaining the complexities of brood pouch anatomy, this research contributes to our understanding of male pregnancy physiology in syngnathid fishes. Further exploration of these exceptional reproductive adaptations offers insights into broader themes of reproductive diversity and adaptation in vertebrates.

ID 355 - INVESTIGATION ON THERAPEUTIC POTENTIALS OF SOME POLYPEPTIDES FOR TYPE-II DIABETES USING COMPUTATIONAL APPROACH

AUTHORS: Nicolas Campos (Stephen F. Austin State University)

ABSTRACT

Diabetes is a growing health concern for individuals across the globe. With its prevalence in society growing more

each year, it has sparked new interests in combating this widely spread disease through several methods. Peptide therapy is one of these methods in which a polypeptide sequence can be synthesized and used as an inhibitor and an activator when it comes to Insulin's function as a hormone to mediate blood glucose function. Computational studies using protein-ligand docking software (Auto Dock, Cluspro, and AlphaFold[TD1]), with the generation of 3D structure of proposed peptide sequence through AlphaFold 2. The protein-protein interaction aided the optimization of protein sequence while searching for the best candidates, which inhibit insulin aggregation, and act as allosteric effector of Human Serum Albumin (HSA) simultaneously in the blood. In our study, the protein sequence was derived from interactions between insulin-insulin and insulin-HSA complex from previous docking experiments. The designed polypeptides show similar mutual interactions with insulin and Human Serum Albumin (HSA) compared to native insulin protein. Our approach in utilizing docking tools and Nobel-prized AlphaFold 2 program for the generation of a target peptide sequence can be used to analyze and treat a variety of ailments alongside diabetes in the future. With the growing utility in docking software as well as AI, we foresee success of our research bringing more validity and interest in the software used in the future to be able to analyze additional complex ailments affecting the population.
[TD1]protein-ligand docking software

ID 356 - COMPARATIVE ANALYSIS OF B-CELL REPERTOIRE AND THERAPEUTIC ANTIBODY VARIABILITY: IMPLICATIONS FOR PHAGE DISPLAY LIBRARY DESIGN

AUTHORS: Tarun Hariharan (Flower Mound High Sch)

ABSTRACT

Monoclonal antibodies are an expanding class of therapeutics in biopharma. While several antibody discovery technologies exist, in modern times, there is a heavy reliance on antibody phage display libraries, which are often designed to mimic amino acid distribution patterns in the natural B-cell repertoire (BCR). This study aimed to examine position-specific distribution patterns of variable heavy and light chain sequences of antibodies between the vast BCR repertoire and a clinical-stage therapeutic (CST) antibody dataset to evaluate overlap, influence, and unique characteristics within each dataset. Here we show that 95% of sequences in both datasets shared a similar frequency distribution pattern, suggesting that the CST dataset may serve as an alternative to BCRs in certain contexts. However, we identified notable deviations in seven positions in the variable light chain and six in the variable heavy chain between the two datasets. Surprisingly, 12 of these 13 unique positions were in the framework region, which is thought to be highly conserved, and structural analysis suggests that the framework positions are integral for the stability of the molecule, which in turn influences the functional activity. Our results demonstrate how while there are differences between the BCR and CST databases, they both are similar, and the CST could serve as an adequate library for immunotherapy creation. Our findings have significant implications for the redesign of BCR-based phage libraries, recommending that library designs incorporate CST-specific distribution patterns to more accurately reflect drug-like sequences. This has potential to make the process of creating immunotherapies far more efficient.

ID 359 - TEACHING STUDENTS MASTERY OF INSTRUMENTATION USING MICRO-CREDENTIALING

AUTHORS: Darrell Fry (Stephen F. Austin State University)

ABSTRACT

Micro-credentialing is becoming increasingly popular for numerous reasons. From the student's perspective, they can see a specific tangible outcome is obtainable within a fixed period of time. This is in stark contrast to the traditional teaching method where (often) the outcomes are not as focused or tangible. Moreover, the timeframe for learning is often month's instead of hours. From the employer's point of view, the specificity of the micro-credentialing allows them to choose candidates who have specific skills that they need. At Stephen F. Austin State University, we have begun to use micro-credentialing as a way to motivate students to master chemical instrumentation. We are developing a micro-credentialing modules for various instruments. In this presentation, we

discuss the the micro-credentialing for the atomic absorption spectrometer, the ultraviolet visible spectrometer, and the gas chromatograph mass spectrometer micro-credentialing modules. We also share some student feedback to date, and chart a way forward on the project based upon the student feedback.

ID 363 - CLASSIFYING Z-RELATED SETS OF ORDER 5

AUTHORS: Nicholas Jones[1]; William Erickson[1] (1. Baylor University)

ABSTRACT

In music theory, two chords are called "Z-related" if they share the same multiset of intervals. Typically one considers a scale with n=12 pitches, but we can generalize to an arbitrary n. The natural goal here is to understand the structure of all Z-related chords. The problem has been solved for chords with 4 pitches, but remains open for larger cases. In this talk, we classify the Z-related chords with 5 pitches for an arbitrary n.

ID 375 - SYNERGISTIC EFFECTS OF WATERCRESS EXTRACT WITH PLANT FLAVONOID KAEMPFEROL AGAINST OXIDATIVE DAMAGE IN HUMAN SERUM ALBUMIN

AUTHORS: Nkeiruka Aziekwu[1]; Bidisha sengupta[2] (1. United States, 2. Stephen F. Austin State University)

ABSTRACT

Oxidative damage results from an imbalance between the production of oxidants and the body's antioxidant defenses, poses significant risks to cellular integrity, particularly affecting biomolecules such as DNA, proteins, and lipids. Human serum albumin (HSA), the most abundant protein in plasma, plays crucial physiological roles and efficiently carries hormones, fatty acids, and drugs due to its multiple binding sites. The existence of a single tryptophan residue (fluorophore region) located within the hydrophobic domain of HSA permits the effective use of optical spectroscopy techniques, such as UV/VIS and fluorescence, to study ligand binding and conformational changes. Oxidative damage to HSA induced by hydroxyl radicals generated using Fenton's reagent (FeSO 4 and H 2 O 2), along with copper (II) chloride and ascorbic acid to produce dehydroascorbic acid. This present study focuses on the antioxidant effects of watercress (Nasturtium officinale) extract and its flavonoid component, kaempferol, against oxidative damage. Techniques including UV/VIS absorption, steady-state fluorescence, circular dichroism, HPLC, and gel electrophoresis revealed significant structural alterations in HSA, such as fragmentation and aggregation. The results obtained demonstrated that ascorbic acid could act as an oxidant in the presence of copper, and the combination of watercress extract and kaempferol effectively reduced oxidative damage. This highlights their potential as natural antioxidants in combating oxidative stress and promoting cellular health and provides valuable insights into the role of phytochemicals in preventing and treating oxidative stress-related conditions.

ID 376 - OPTIMIZING SKELETAL CAST RESOURCES: DEVELOPING STANDARDIZED MAINTENANCE PROTOCOLS FOR ENHANCED OSTEOLOGY STUDY AT TEXAS STATE UNIVERSITY

AUTHORS: Nathalia Garza[1]; Stephanie Baker[1] (1. Texas State University)

ABSTRACT

Direct engagement with skeletal remains is essential in human osteology courses because it allows students to develop a comprehensive understanding of bone structure, morphology, and anatomical landmarks through tactile and visual learning. Students are expected to master all 206+ bones in the human body, along with numerous osteological landmarks. Ideally, they would have consistent access to real human skeletal remains, but this is often limited due to restricted classroom and open-lab hours. Anatomically accurate skeletal casts offer a practical alternative for independent study. At Texas State University's (TXST) Albert B. Alkek Library, eight sets of these casts are available, but they have not been regularly inspected or maintained by experienced osteologists. To address this, standardized protocols were developed in collaboration with the library to ensure the maintenance, organization,

and accurate labeling of the casts. This initiative aims to offer students clean, well-organized skeletal resources accessible beyond open-lab hours, enhancing opportunities for independent learning. Effective cleaning methods were established using detergent disinfectant and acetone for ink removal, while “Goo-Gone” was used to eliminate adhesive residue from tape and labels. Additionally, each bone was labeled with a unique ID number, enabling easier tracking, organization, and retrieval, which improved students' access to the collection for study purposes. There are plans to extend these practices to the TXST Round Rock Campus Library to further support additional osteology and anatomy students. Ultimately, these standardized protocols can serve as a model for other institutions facing similar challenges.

ID 378 - GENE FLOW AMONG POPULATIONS OF THE ANNUAL WILDFLOWER MENTZELIA PECTINATA (LOASACEAE).

AUTHORS: Amy Osborn[1]; Gisela Guerrero[1]; Jessica Edo[1]; Yourim Cho[1]; Joshua Brokaw[1] (1. Abilene Christian University),

ABSTRACT

Mentzelia pectinata is an annual wildflower native to southern California that was recently split into two varieties, M. pectinata var. chrysopetala (Obispo blazingstar) and M. pectinata var. pectinata (San Joaquin blazingstar). The former is typically yellow in appearance, and the latter is generally orange. To investigate whether flower color is a good predictor of genetic subdivision, we developed microsatellite markers to determine if populations of the respective varieties experience gene flow consistent with levels observed in other infra-specific taxonomic groups. Potentially informative microsatellite loci were identified by sorting through Illumina high-throughput sequencing from M. pectinata for common dinucleotide and trinucleotide repeat patterns. We developed primers from the DNA sequences flanking several microsatellite candidates and tested them for PCR amplification and fragment analysis. Based on our first developed locus, a trinucleotide ‘CAA’ repeat, we genotyped a total of 121 individuals across Mentzelia pectinata var. chrysopetala (B730, B739, B740, and B744) and M. pectinata var. pectinata (B743 and B745). Allele sizes ranged from 136 to 175 base pairs, and 31% of individuals were heterozygous. The two greatest Fst values (0.654 and 0.550) were between populations with different flower colors. The two smallest Fst values (0.010 and 0.048) were between populations with match flower colors (yellow and orange, respectively). However, there were populations with mismatching colors that had low Fst (0.102) and populations with matching colors that had high Fst (0.322). Thus, isolation by distance and flower color may be factors in the genetic subdivision of populations.

ID 380 - SEARCHING FOR THE K-PG IRIDIUM ANOMALY IN CENTRAL ARKANSAS

AUTHORS: Mindy Faulkner[1]; Rebecca Beyer[1] (1. Stephen F. Austin State University)

ABSTRACT

Iridium is one of the rarest occurring elements in the Earth’s crust, with an average concentration of 10-12 ppb. Global documentation of thin, stratigraphic upticks in the concentration of iridium are associated with the impacts of large asteroids. The most well-known of these iridium anomalies is the Cretaceous-Paleogene (K-Pg) Boundary, the result of the Chicxulub asteroid impact. In central Arkansas, exposed Cretaceous-aged nepheline syenite is overlain by Paleocene and Eocene sedimentary layers that represent a potential iridium anomaly across the K-Pg boundary. This outcrop is located near Bauxite, Arkansas, in formerly mined lands where stockpiles of aluminum ore are stored. In March 2024, four stratigraphic sections were measured in the Sardis Pit across the K-Pg boundary. Sixty samples were collected, labeled, and then individually ground using a porcelain mortar and pestle. Each sample was analyzed using a Thermo Scientific hXRF instrument. These data were used to create a series of litho- and chemo-stratigraphic correlations of elements of interest including lanthanum, niobium, barium, silver, uranium, and others. LA-ICP-MS analysis was conducted on twelve of the sixty powdered samples, which yielded concentrations of various elements including iridium. An iridium spike characteristic of the K-Pg boundary iridium anomaly could not be identified with

this sample size, but the analyses did report have nine samples with a greater mean concentration of iridium than the average concentration within the Earth's crust. These data could represent sediment transported into the study site from areas with a greater concentration of iridium.

ID 381 - BIOINFORMATIC ANALYSIS OF COX 1 AND COX 2 PROTEINS

AUTHORS: Jerry Leisure (Texas A&M University)

ABSTRACT

Cyclooxygenase (COX) enzyme is a highly conserved protein with several different isoforms. The two main isoforms are COX 1 and COX 2. The purpose of the enzyme is to synthesize the prostaglandin lipid in most living organisms. Another potential product of COX 1/COX 2 is tumor promoters. Certain cancers, like ovarian (COX 1) and liver carcinomas (COX 2), show upregulation of both enzymes. This leads to increased inflammation and promotes tumor growth. With the help of bioinformatic tools, both isoforms of COX enzyme were analyzed. Conserved sequences were obtained from the National Center for Biotechnology Information (NCBI) database. These sequences were then analyzed using MEGA11 to perform Multiple Sequence Alignment (MSA) and phylogeny analysis. Cytoscape was also used to identify potential interaction between the COX enzymes and other biomolecules. The results confirm the sequences for both COX isoforms are highly conserved and are present in many different species. Upregulation also indicates that there are interactions with other biomolecules. This could help identify biomarkers and treatment pathways for diseases like cancer.

ID 387 - CHARACTERIZATION OF AFFIBODY MOLECULES THAT TARGET CROTALID SNAKE VENOMS

AUTHORS: Edith Osborne (Angelo State University)

ABSTRACT

The Crotalinae subfamily of pit vipers, which includes rattlesnakes, copperheads, and water moccasins, are commonly found in many parts of the U. S., including Texas. In order to expand our knowledge of snake venoms and possibly open the door to new antivenom options, our laboratory used an affibody phage display library and identified an affibody molecule that specifically targets Crotalid snake venom proteins. Affibodies are a type of small protein that can be designed to bind with high affinity to a researcher's protein of choice. As the affibody was identified while attached to the bacteriophage M13 protein pIII, the affibody was cloned into a p6xHis-SNAP-tag plasmid for further characterization. Using the SNAP-tag to bind the affibody to a SNAP-capture resin, several possible snake venom protein targets were identified, including several proteases. Further studies have indicated that the affibody shows increased binding to Crotanlinae venom over venom from Agkistrodon conanti.

ID 388 - CRYSTAL GROWTH AND CHARACTERIZATION OF INTERMETALLICS FOR CORRELATED EMERGENT PROPERTIES: DISORDER IN Ce2MnGe6

AUTHORS: Morgan E. Raines[1]; Benny C. Schundelmier[2]; Teddy G. Spencer[1]; Gregory T. McCandless[1]; Kaya Wei[2]; Julia Y. Chan[1] (1. Baylor University, 2. Florida State University),

ABSTRACT

Disorder in extended solids is well documented and can participate in the formation of unexpected physical properties in intermetallic crystals that can often be advantageous for societal application. Predicting and controlling disorder in crystalline structures remains challenging due to the high temperatures and inert environments required for intermetallic crystal growth. Here, we present a new crystal structure for Ce 2 MnGe 6 (La 2 Al 1+x Ge 6-x type-structure) and demonstrate that disorder in the structure can be reproducibly controlled through synthesis. The disorder is localized to the α -Po-like slab, comprised of distorted Ge square nets capped by Mn atoms, whose capping pattern varies with disorder. Expecting a change in magnetic properties due to the Mn positional disorder,

we measured the magnetic and transport properties of ordered and disordered single crystals. Both samples exhibit magnetic moments of 7.1 μ B /F.U. (calc: Ce 3+ = 2.54 m B), indicating a Mn contribution, supported by the relatively high transition temperature of 134.5 K. However, the magnetic susceptibility reduces from 24 cm 3 /mol F.U. (ordered) to 16 cm 3 /mol F.U. (disordered), likely due to the variance in the Mn-Mn distances in the disordered structure. By controlling disorder and analyzing its effects on physical properties, we aim to map the impact of defects in intermetallic systems. This approach establishes disorder as a tunable parameter for optimizing material properties.

ID 389 - THE GROWTH AND CHARACTERIZATION OF INTERMETALLIC COMPOUND Gd4Mn4Sn7

AUTHORS: Teddy G. Spencer[1]; Morgan E. Raines[1]; Gregory T. McCandless[1]; Julia Y. Chan[1] (Baylor University)

ABSTRACT

Inspired by Gd-based skyrmions and the high magnetic ordering temperature of Mn, we present a study on the growth and characterization of Gd 4 Mn 4 Sn 7 . This structure is comprised of the CuAl 2 and MnZn 2 subunits, highlighting Sn and Mn linear chains without distortion along the c-axis. Gd 4 Mn 4 Sn 7 is a metastable phase that has previously only been synthesized through arc-melting and subsequent annealing. Using the flux growth technique, single crystals were obtained in excess Sn flux. Gd 4 Mn 4 Sn 7 was confirmed to be isostructural to the parent structure Zr 4 Co 4 Ge 7 with single crystal X-ray diffraction (I 4/ mmm a = 15.0687(17) Å and c = 5.9390(9) Å). Using differential scanning calorimetry as an aid to our synthetic method, we have observed exothermic events at 1018 °C, 787 °C, and 695 °C. Further growth optimization is ideal to obtain large single crystals for physical properties measurements. However, using the principle of an empirical "critical" distance between the Mn-Mn bonds, we can predict that the 2.969 Å Mn-Mn bond results in a ferromagnetic ordering of the Mn sublattice.

ID 393 - ORCO AND IR8a CO-RECEPTOR KNOCKOUT LEADS TO DIS-REGULATION OF TUNING RECEPTORS AND OTHER CHEMOSENSORY GENES IN AEDES AEGYPTI

AUTHORS: Matthew Cooke[1]; Jason Pitts[1]; Michael Chembars[1] (1. Baylor University)

ABSTRACT

Insect olfaction has been extensively studied in the mosquito, Aedes aegypti . This species uses its sense of smell to locate hosts for blood meals and other resources, contributing to its impact as a vector for human pathogens. Two major families of protein-coding genes, the odorant receptors (ORs) and the ionotropic receptors (IRs), provide the mosquito with sensitivities to distinct classes of volatile compounds in the antennae. Individual receptors in both families require co-receptors for functionality, Orco for all ORs, and IR8a for many IRs. In Drosophila melanogaster, disruptions of Orco or IR8a impair receptor function and membrane localization, leading to general anosmia for their respective compound classes. We reasoned that Orco and IR8a might also be important for coordinated chemosensory receptor expression in the antennal sensory neurons of Aedes aegypti . To test this hypothesis, we performed RNAseq and analyzed differential expression in mutant strains versus wildtype. Our analyses reveals ORs and IRs are under-expressed in Orco mutants, while IRs are under-expressed in IR8a mutants. Additional chemosensory and non-chemosensory genes are also dis-regulated in these mutants. These data suggest a previously unknown pleiotropic role for the Orco and IR8a co-receptors in the coordination of expression of chemosensory tuning receptors within the antennae.

ID 394 - EVALUATING DEEP LEARNING MODELS FOR MULTICLASS CLASSIFICATION OF LIGO GRAVITATIONAL WAVE GLITCHES

AUTHORS: Rudhresh Manoharan[1]; Gerald Cleaver[1] (Baylor University)

ABSTRACT

Gravitational-wave observatories such as LIGO have revolutionized our understanding of the universe by detecting ripples in spacetime caused by cataclysmic astrophysical events. However, the presence of transient noise artifacts, known as glitches, poses a significant challenge by interfering with signal detection. Identifying and classifying these glitches is essential for enhancing the accuracy of gravitational-wave analysis. Glitches are categorized into 24 distinct classes based on their morphological features, and their classification is a multiclass problem that benefits from advanced machine learning techniques. Traditional methods, such as Gradient Boosted Trees (GBT), have been effective in this domain. However, the potential of deep learning (DL) models to achieve comparable or superior performance remains underexplored, particularly on tabular datasets where they often struggle without extensive preprocessing and optimization. Here, we present a comparative study of DL models for multiclass glitch classification using LIGO data. We show that while DL models achieve competitive F1 scores, the GBT baseline continues to outperform them under default configurations. Notably, the performance of DL models is heavily influenced by data preprocessing techniques, feature engineering, and model-specific optimization. Furthermore, the highly imbalanced nature of the dataset exacerbates the challenges for DL models, requiring tailored strategies to improve their robustness. These results demonstrate that while DL models hold promise, GBT remains a reliable standard for tabular data in this domain. Future efforts should focus on addressing data imbalance and optimizing preprocessing pipelines for DL models, providing a pathway for their broader applicability in gravitational-wave astrophysics.

ID 395 - COGNITIVE IMPROVEMENT AND PREFRONTAL NETWORK INTERACTIONS IN INDIVIDUALS WITH REMITTED BIPOLAR DISORDER AFTER TRANSCRANIAL INFRARED LASER STIMULATION

AUTHORS: Roger Davis[1]; Douglas Barrett[1]; Erin Logue[1]; Andreana Haley[1]; Amy Bichlmeier[1]; Lucy Chibib[1]; Jennifer Siegel-Ramsay[1]; Farzad Salehpour[1]; Laura Gamboa[2]; Anagh Mirji[1]; Kevin Thakkar[1]; Gabriela Guimaraes[1]; Sarah Diaz[2]; Hunter Dutkiewicz[2]; Isabelle Rose[1]; Jana Jimenez[1]; Jordan Schwartz[1]; Jorge Almeida[1]; Francisco Gonzalez-Lima[2] (1. University of Texas at Austin, 2. University of Texas)

ABSTRACT

Converging evidence suggests that bipolar disorder (BD) involves mitochondrial dysfunction and prefrontal cortex (PFC) hypometabolism associated with cognitive impairment, which persist in individuals with remitted BD. Transcranial infrared laser stimulation (TILS) provides safe, non-invasive brain stimulation that enhances PFC metabolism via photobiomodulation of mitochondrial respiration and tissue oxygenation. We tested the hypothesis that the neurocognitive deficits found in BD may be ameliorated by TILS treatments. This is the first study to explore neurocognitive effects of repeated TILS administration in BD. Using an open-label design, 29 individuals with remitted BD received six weekly TILS treatments. Working memory, attention, and executive function were assessed with trail-making, 2-back, and Cambridge Neuropsychological Test Automated Battery (CANTAB) tasks. Changes in PFC network interactions were measured with functional near-infrared spectroscopy (fNIRS), which tracks TILS effects on oxygen metabolism in the PFC of individuals with BD. Participants reported no adverse effects, confirming the safety of TILS in individuals with BD. Cognitive test results showed that TILS significantly improved performance in trail-making ($p<0.01$), 2-back ($p<0.001$), and CANTAB tasks, including response inhibition speed ($p<0.01$), sustained attention ($p<0.05$), and cognitive flexibility ($p<0.01$). TILS enhanced speed and accuracy, reflecting improved cognitive flexibility, working memory, and attentional control. The fNIRS results showed a significant reduction ($p<0.001$) in PFC network correlations of oxygenated hemoglobin changes driven by cognitive task performance. The right-hemisphere frontopolar cortex showed greater TILS effects than its left-hemisphere counterpart. These findings support repeated TILS as a promising, safe, and effective intervention for improving cognitive function in individuals with remitted BD.

ID 403 - MODELLING PATTERNS OF REPRODUCTIVE OCCUPANCY TO INFORM MANAGEMENT OF TOADS IN A DYNAMIC DESERT SYSTEM

AUTHORS: Sadie Roth[1]; Matthew A. Barnes[1]; Kerry Griffis-Kyle[1] (Texas Tech University)

ABSTRACT

Amphibians are the most threatened vertebrate taxon in the world, partially due to their biphasic lifecycle (i.e. terrestrial adults and aquatic tadpoles), which requires suitable terrestrial and aquatic habitat to co-occur in time and space. This can be problematic in highly dynamic systems such as the Sonoran Desert, where amphibian breeding habitat is relatively rare and the quality of habitat is extremely variable spatiotemporally. As climate change and water management practices, such as the creation of constructed waters, alter the quality and timing of resources for amphibians, understanding drivers of breeding effort and tadpole occupancy may be vital to future conservation of populations. To investigate habitat characteristics related to patterns of adult breeding effort and tadpole occupancy for a Sonoran Desert amphibian, the red-spotted toad (Anaxyrus punctatus), we sampled waters for five years using passive acoustic monitoring and dip-net surveys. Using a multi-state dynamic occupancy model, we found that occupancy probability of adult breeding was higher at natural sites, closer to drainages, and with more rainfall, but notably, tadpole occupancy was not impacted by the tested water quality metrics. Therefore, limitations to adult breeding are more likely to drive tadpole occupancy than aquatic habitat quality. This emphasizes the importance of monsoonal rainfall and availability of natural waters, both of which are threatened by climate change, to the successful reproduction of these toads. These findings underscore the critical need for conservation strategies that prioritize natural waters and account for the impacts of changing rainfall patterns to support these desert amphibian populations.

ID 410 - ORGANIC SYNTHESIS OF NORNEOLAMBERTELLIN

AUTHORS: Nick Welch[1]; Cody Dubes[1] (Schreiner University)

ABSTRACT

Norneolambertellin is an organic compound made by the mycoparasite Labertella sp 1346 which has been isolated with the potential to be used as an antifungal for medicine and fungicides. The goal of the research project is to synthesize norneolambertellin by esterification of a coumalic acid derivative and 2-bromophenol and cyclization by palladium reagents. Over a 10-week research term, intermediates for cyclization were successfully formed by esterifying coumalic acid and 2-bromophenol. The esterification process was optimized by using oxalyl chloride acid halide production and nucleophilic acyl substitution of 2-bromophenol with triethylamine base. After workup and isolation by silica gel plug the reaction resulted in a 94.65% yield. Attempts on cyclization are currently being attempted as well as reactions with the target specific reactants.

ID 418 - MAKING DECISIONS: DOES MITOCHONDRIAL METABOLISM INFLUENCE RETINOGENESIS?

AUTHORS: Yaqueline Gutierrez[1]; Yessenia Beltran[1]; Emilia Santamaria[1]; Elda Rueda[1] (1. University of Houston-Downtown)

ABSTRACT

The retina is the light-capturing tissue of the eye that allows us to see. Neurons and glial cells make up the adult-retina. During development, a pool of stem-like cells called the retinal progenitor cells (RPCs) give rise to neurons and glial cells. RPCs must make decisions to continue proliferating or exit the cell-cycle to enter retinogenesis. By the end of development about half of neurons in the inner retina need to die for the necessary neural connections to form. Thus, cell division, neurogenesis, and cell-death are spatiotemporally coordinated and tightly regulated to produce a specific ratio of the different cell types within the adult-retina. The molecular mechanisms that regulate such cell decisions are not completely understood. Metabolism is an essential factor for development. This is evident by congenital retinal disorders caused by mutations in metabolic enzymes. Metabolism is the set of cellular processes that convert nutrients into cellular energy. Most enzyme-mediated metabolism occurs in mitochondria. To investigate how metabolism interfaces with retinogenesis we disrupted the expression of the mitochondrial transcription factor A (TFAM) in the RPCs of mice. In the current study we are characterizing the consequences of

Tfam loss in the developing retina.

ID 419 - INVESTIGATION OF THE ROLE OF PROLACTIN DURING REPRODUCTION IN A FISH WITH MALE PREGNANCY

AUTHORS: Sunny Scobell (Southwestern University)

ABSTRACT

All members of the teleost fish Family Syngnathidae (seahorses, pipefish, and seadragons) reproduce via male pregnancy. Females transfer eggs to the ventral pouch of the male where fertilization of eggs and development of offspring occurs. Early research showed a clear role for pituitary hormone regulation of the brood pouch during pregnancy. However, the limitations of working with such non-model, small-bodied fishes has slowed the understanding of this novel endocrine axis. We used traditional histological staining paired with multi-fluorescent immunohistochemistry and scanning electron microscopy to investigate the hypothalamic-pituitary-pouch (HPP) axis. Prolactin, a likely mediator of the brood pouch inner epithelium growth and osmoregulatory function, was found in the rostral pars distalis of the pituitary of pipefish and seahorses. Dopamine is a known regulator of prolactin release in fishes. We have localized dopaminergic neurons in the hypothalamus of pipefish and seahorses and found they project to the pituitary. In the brood pouch, we found that prolactin, prolactin receptor, and sodium/potassium ATP-ase pumps colocalized in the inner epithelium that interfaces with the embryos. We also found that sodium/potassium ATP-ase expression changed over the course of pregnancy, which suggests that these ionocytes are responsible for the dynamic changes in osmolarity of the brood pouch fluid over the course of pregnancy. Because the morphological and physiological changes that occur during pregnancy in male syngnathids exhibit similarities with those of female mammals, syngnathids are a promising model for understanding the convergent evolution of mechanisms mediating pregnancy.

ID 421 - IN VITRO STUDIES ON ETHANOLIC EXTRACTS OF WATERCRESS LEAVES USING SPECTROSCOPIC AND CELL VIABILITY ASSAYS

AUTHORS: Bidisha Sengupta[1]; Debarshi Roy[2] (1. Stephen F. Austin State University; 2. Alcorn State University)

ABSTRACT

Watercress (WC) is an aquatic leafy, perennial vegetable used in salads and soups. Literature provides evidence on therapeutic importance of WC in treating wide spectrum of heath disorders, which include hypertension, cardiac and hepatic diseases, cancer, arthritis, and bronchitis. In this study, the total flavonoid content (TFC), total antioxidant capacity (TAC), and total phenolic acid content (TPAC) of ethanolic extract of watercress leaves were determined using various colorimetric methods. Chemical structural analysis was conducted through attenuated total reflectance-Fourier transform infrared spectroscopy (ATR-FTIR). In vitro molecular and cellular studies with the ethanol extract of WC were carried out with human serum albumin (HSA) and ovarian cancer cells respectively. A fluorescence based binding analysis of the watercress ethanol extract (0.5% by volume) with HSA was conducted and compared that with flavonols (e.g. kaempferol and quercetin) and phenolic acid (e.g. gallic acid) binding profiles. Ovarian cancer (OVCA) is the most lethal gynecological cancer due to the difficulty in early diagnosis and remains undetected in early stages. Drug resistance and tumor recurrence are commonly observed in OVCA patients, which urge the identification and validation of newer/alternative therapeutics for the treatment of OVCA. Based on the findings from HPLC and biochemical assays, we hypothesized that WC extract could exert its anticancer effect against OVCA. Preliminary studies were conducted in chemosensitive (HeyA8) and highly chemoresistant (HeyA8MDR) ovarain cancer (OvCa) cell lines, where interesting cancer-fighting abilities of WC extract was noticed.

ID 425 - SYNERGIZING BIOCOMPATIBLE NANOAGENTS WITH AI FOR REVOLUTIONARY FORENSIC FINGERPRINT ANALYSIS

AUTHORS: Jingbo Liu[1]; John-Ryan Lawrence[1]; Zhaohui Wang[2]; Sajid Liu[1] (1. Texas A&M Kingsville; 2. North Carolina A&T State University)

ABSTRACT

Forensic chemistry has advanced in fingerprint identification and data analysis. This presentation explores the evolution of fingerprint analysis, emphasizing chemical innovations and the integration of artificial intelligence (AI) for enhanced detection and interpretation. The research focuses on developing nanostructured fingerprint-detecting agents, specifically bio-polymer-ligated iron-oxide composite enhancers (β-POLICEs), to advance criminal investigations in South Texas. Utilizing a green wet-chemistry approach and an orthogonal design, the team synthesized a series of β-POLICEs optimized for high affinity with latent fingerprint residues. These nanoparticles are deployed onto surfaces bearing latent fingerprints and visualized using specific lighting conditions or magnetic field-assisted techniques. High-resolution images of the enhanced fingerprints are captured for comprehensive analysis. The experimental results indicate a 40% increase in detection accuracy, underscoring the potential of nanotechnology to elevate the sensitivity and specificity of forensic fingerprint analysis. The Kleberg County Sheriff's Office (TX), Criminal Investigations and Network Analysis Center, and the Fairfax Police Department (VA), can benefit from integrating β-POLICEs into their forensic methodologies, improving the identification and matching of latent fingerprints. This study highlights nanotechnology's transformative capability in forensic investigations, advancing criminal investigations. Implementing AI, Recursive Neural Networks with a 3-node architecture, has revolutionized fingerprint analysis by enabling high-throughput data processing and precise pattern recognition. Principal Component Analysis enhances the analysis of partial or smudged prints, thereby increasing match accuracy. This presentation emphasizes the innovative approach to designing nanomaterials and the dynamic interactions at these interfaces, demonstrating the crucial role of chemical and materials science in driving forensic fingerprint analysis forward.

ID 426 - PIONEERING CLIMATE RESILIENCE THROUGH INNOVATING PROPERTY-VARIABLE MATERIALS FOR SOUTH TEXAS' ENERGY TRANSITION

AUTHORS: Jingbo Liu[1]; Sajid Liu[1] (1. Texas A&M Kingsville)

ABSTRACT

Designing interactive materials across multiple scales is essential for enhancing energy efficiency in the pursuit of decarbonization and net-zero emissions. Optimizing energy conversion efficiency is crucial for reducing energy expenditure, improving production processes, and mitigating environmental impacts. This focus directly supports sustainable adaptation strategies at both local and global levels. Our team is dedicated to advancing sustainable energy solutions by predicting experimental outcomes using evolving dynamic functions. This methodology significantly enhances the energy density of the materials and systems we develop. This presentation will cover advancements in hydrogen and ammonia production and storage via electrolysis, CO 2 capture and sequestration using recycled materials, developing high-energy-density batteries and fuel cells, and innovations in energy storage and conversion systems. Specifically, we will emphasize progress in optimizing lithium battery technologies and hydrogen fuel cells, central to our efforts toward sustainable energy solutions. These technologies promise a future where clean and efficient energy is practical and accessible. Our research findings underscore the critical role of interactive materials in the transition to sustainable energy systems. This presentation will demonstrate how meticulous materials design and a deep understanding of interface reactivity can significantly influence the future of energy consumption and production, steering us toward an eco-friendly agenda. By showcasing these advancements, we highlight the transformative potential of our approaches in achieving enhanced energy efficiency and sustainability.

ID 427 - ENGAGING STUDENTS WITH INNOVATIVE TEACHING METHODOLOGY BY INTEGRATION MUSIC INTO CHEMISTRY AND CHEMICAL SCIENCES

AUTHORS: Jingbo Liu[1]; John-Ryan Lawrence[1]; Sajid Liu[1] (1. Texas A&M Kingsville)

ABSTRACT

Encouraging students to think critically requires an innovative approach in linking lecture notes as rhymes or poems, enhances learning by making it engaging and memorable, fostering creative engagement, and reinforcing comprehension. This method is particularly effective for complex topics like coordinative chemistry, making them more accessible and stimulating. Chemistry songs have been demonstrated to boost student engagement and long-term knowledge retention. Coordinative chemistry involves the interaction between a metal, acting as a Lewis acid, and a ligand, serving as a base. This interaction leads to the transfer of electron pairs and the formation of coordination complexes, which exhibit unique properties such as isomerism and magnetic characteristics. These properties, dictated by the complexes' geometry and electron configuration, offer valuable chemical insights. The diverse colors of these complexes arise from their interactions with visible and ultraviolet light, elucidated by crystal field theory. Within the spectrochemical series, the energy splitting determines high-spin or low-spin configurations, subsequently influencing the complex's magnetic behavior. The chemistry song encapsulates the core principles of coordination chemistry, emphasizing the formation and properties of coordination compounds, the significance of crystal field strength, and the impact of energy splitting on magnetism. It is an innovative and engaging tool for understanding and retaining these intricate concepts, promoting a profound appreciation for chemistry. This creative approach not only aids in comprehension but also instills a lasting interest and enthusiasm for the subject.

ID 428 - INNOVATIVE BIOLOGICALLY EQUIVALENT SIMULANT FOR FORENSIC TRACEDROP (BEST) FOR ENHANCED CRIMINAL SCENE RECONSTRUCTION

AUTHORS: Jingbo Liu[1]; Maria Sandoval[1]; Emily Rancourt[2]; Sajid Liu[1] (1. Texas A&M Kingsville; 2. George Mason University)

ABSTRACT

This collaborative project, led by Academia faculty, the Kingsville Police Department, and the Criminal Investigations and Network Analysis Center at George Mason University, aims to innovate criminal investigations near the U.S.-Mexico border with the BEST. Current blood stimulants lack precision, leading to prolonged investigations due to natural blood coagulation. Optimizing BEST formulations will enhance the reliability and efficiency of crime scene analysis. The team employed a micro-emulsion to create BEST agents functionalized with natural product extracts as crosslinkers and anti-degradation agents. This approach supports up to 1 liter of large-scale production while maintaining quality. BESTs exhibit complex heterogeneity in properties like viscosity and surface tension, varying between 20°C and 37°C, improving their accuracy as blood analogs. Analysis of blood spatter patterns demonstrates that RGB values can reveal crime scene details, establishing blood sources and times of death through trajectory reconstruction. This method addresses challenges related to fluid dynamics (e.g. effects of gravity and air drag on blood drop trajectories). BESTs show high homogeneity, tunable viscosity, and stability, retaining their properties for up to one month, enhancing forensic applications' flexibility and accuracy. The blood spatter simulation tool HemoSpat uses Newtonian equations of motion to calculate trajectories and angles. Incorporating HemoSpat aids detectives in reconstructing crime scenes with high precision. This research represents a major advance in forensic science, enhancing the accuracy, scalability, and stability of blood simulants. These innovations promise to improve the reliability of crime scene analysis for blood trace analysis, marking a significant step forward in forensic methodologies.

ID 429 - SOCIAL BELONGING AND IMPOSTOR PHENOMENON EFFECTS ON STUDENT SUCCESS IN CHEMISTRY

AUTHORS: Blain Mamiya[1]; Joyce Macalling[1]; Toluwalase Shobogun[1] (1. University of Texas San Antonio)

ABSTRACT

Recently, research has indicated course performance has a correlation to the social belonging and impostor phenomenon. Social belonging can be broken into two (2) components: 1) the student's feeling of a social connectedness with peers, instructors, and the university; and 2) the student's perception of one's ability to perform relative to others in the course. This perception of one's ability to perform is also defined as imposter phenomenon or impostor syndrome. These components have a dramatic effect on student success of various demographic groups. This research will report the results of the impact of social belonging and impostor phenomenon, of those student's reposting to be impacted by social belonging and impostor phenomenon on First-Generation students, Under-Represented Minorities, and Gender. The results highlight the importance of developing a stronger practice for increasing student's social belonging.

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