TAS
Texas Academy of Science

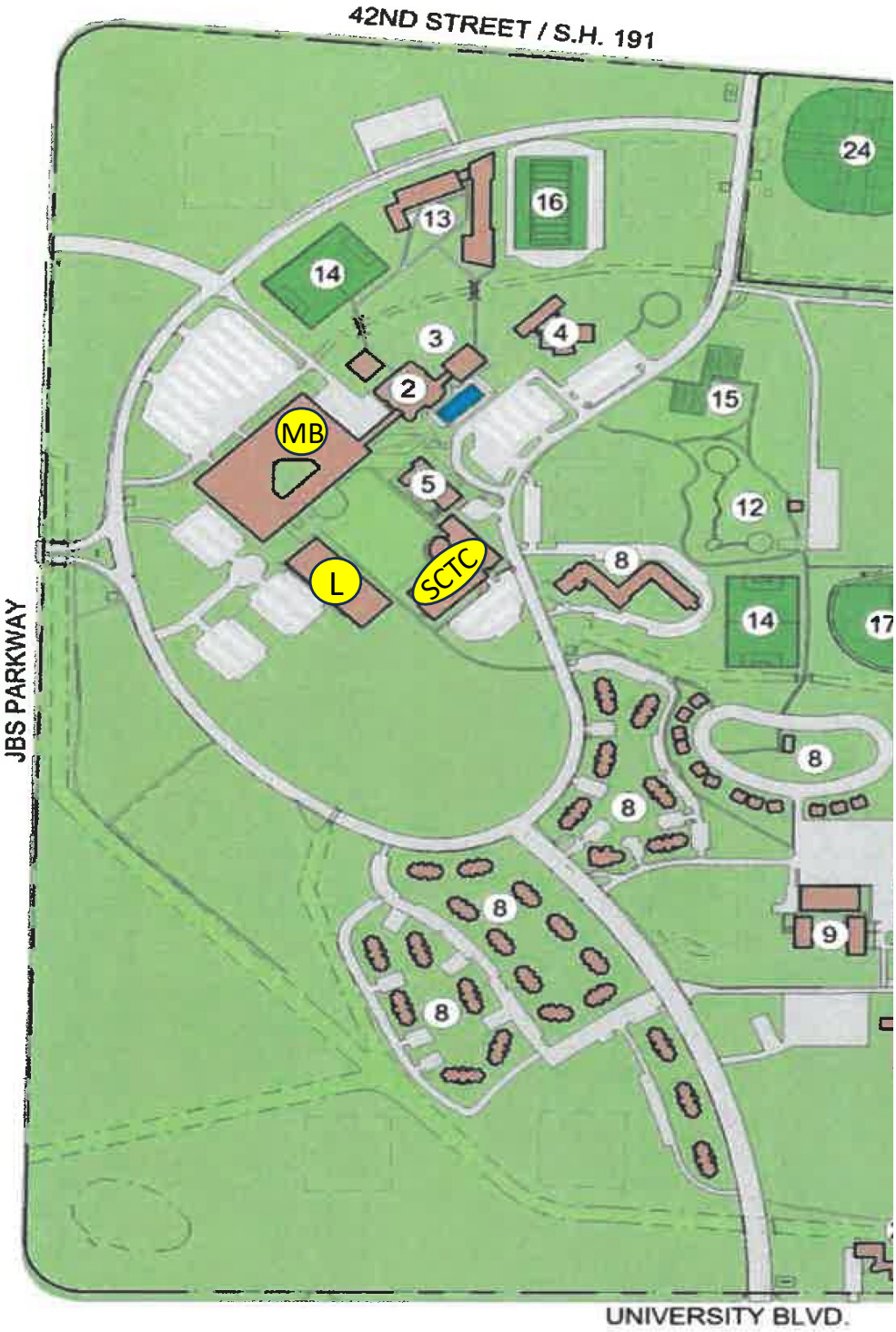
127th Annual Meeting

March 1-3, 2024
Odessa Texas

Discover Odessa
A City Full of Discovery!

THE UNIVERSITY OF TEXAS
PERMIAN BASIN

Campus Map – TAS meeting in highlighted buildings



MB	Mesa Building	Registration, receptions, oral sessions, coffee breaks, collegiate academy headquarters
L	Library	Mixer, posters, graduate school fairs and receptions
SCTC	Science & Technology	Award lectures, Saturday lunch, Science jeopardy, grad competition

Graduate School & Vendor Fair

Library Lobby Friday 5:30-7 pm Saturday 2:30-4 pm

STEPHEN F. AUSTIN STATE UNIVERSITY
THE UNIVERSITY OF TEXAS SYSTEM

UTPB
UTEACH PERMIAN BASIN

Baylor University
GRADUATE SCHOOL

MSU TEXAS
MIDWESTERN STATE UNIVERSITY

Discover Odessa

The University of Texas Rio Grande Valley
Graduate College

syGlass

SWRM
American Chemical Society
W ★ A ★ C ★ O
October 20-23, 2024

UT PERMIAN BASIN
GRADUATE STUDIES

TAS Donors!!

Discover Odessa

PECAN TREE

Matthew Barnes
Kelsoe Garnett
Chris Ritzi

LONE STAR

Jingbo Liu

MOCKINGBIRD

David Lemke
Sandra West Moody

BLUEBONNET

Timothy Campbell
Bob Kane
Troy Ladine
Travis LaDuc
Brian Laub
Gerry Mulvey
Christopher Vitek
Kathy Wood

Brief Schedule

Texas Academy of Science 127th Annual Meeting 29 Feb - 03 Mar 2024 *All times in CST*

Thursday, 29 February

8:30am

Field Trip 1: The geologic history and fossil content of the Lower Cretaceous strata exposed southwest of McCamey, Texas
Meet in Mesa Building main parking lot

Friday, 1 March

7:30am

Board of Directors Meeting
MB 2104C

10am

Set-up Posters
Library Event Studio

Student Mixer
Library Foyer

Registration
MB Registrar's Foyer

11am

Section Chairs Meeting
MB 2110

12:30pm

Freshwater Science A
MB 2260

Cell & Molecular Biology
MB 2270

Chemistry & Biochemistry A
MB 3261

Anthropology & Geosciences
MB 3269

Terrestrial Ecology and Management
MB 4250

2pm

Cell & Molecular Biology Section Meeting
MB 2270

Anthropology & Geosciences Section Meetings
MB 3269

2:15pm

Freshwater Science Section Meeting
MB 2260

Terrestrial Ecology and Management Section Meeting
MB 4250

2:30pm

Coffee Break
MB Foyer (2nd/3rd/4th floors)

3pm

Plant Biology & Systemics & Evolutionary Biology
MB 2260

Biomedical Sciences
MB 2270

Chemistry & Biochemistry B
MB 3261

STEM Education A
MB 3269

4:15pm

Biomedical Sciences Section Meeting
MB 2270

4:30pm

Plant Biology + Systemics & Evolutionary Biology Section Meetings
MB 2260

4:45pm

Chemistry & Biochemistry Section Meeting
MB 3261

5:30pm

Poster Session A
Library Event Studio

Graduate School and Recruitment Fair
Library Lobby

Reception at Poster Session A
Library Lobby

Saturday, 2 March

7:30am

Breakfast Reception (by invite) - Past Presidents, Fellows, and BOD
MB 2104C

8am

Registration
MB Registrar's Foyer

8:30am

Coffee
MB Foyer (2nd/3rd/4th floors)

9am

Freshwater Science B & Marine Science
MB 2260

Conservation Ecology + Neurosciences
MB 2270

Physics & Engineering & Mathematics & Computer Science
MB 3261

STEM Education B
MB 3269

10:15am

Conservation Biology and Neuroscience Section Meetings
MB 2270

Brief Schedule

Texas Academy of Science 127th Annual Meeting 29 Feb - 03 Mar 2024 *All times in CST*

Continued from **Saturday, 2 March**

STEM Education Section Meeting
MB 3269

10:45am

Marine Science Section Meeting
MB 2260

Physics & Engineering and Mathematics & Computer Science Section Meetings
MB 3261

11:15am

TAS Award Presentations
SCTC 1010

12:45pm

Science Jeopardy!
SCTC 1010

Lunch
SCTC 1010 Foyer

2:30pm

Poster Session B
Library Event Studio

Graduate School and Recruiting Fair (at Poster Session)
Library Lobby

Reception at Poster Session B
Library Lobby

4pm

Grad Student Competition
SCTC 1010

5:30pm

Section Chairs Meeting
SCTC 1102

7pm

Awards Banquet
MCM Grande FunDome Hotel

Sunday, 3 March

8am

Field Trip 2: Ecology of an Urban Playa Lake
Meet in Science & Technology Building main parking lot

Welcome and Acknowledgments from the President

Welcome to the 127th meeting of the Texas Academy of Science!

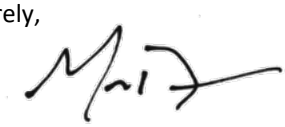
We are excited to bring the Academy to the University of Texas Permian Basin, an institution that challenges the world to "think large and live local." Highlights of this year's meeting will include lectures from our Distinguished Texas Scientist Daniel Romo (Baylor University) and Outstanding Texas Educator Krystle Moos (Midway High School). The meeting will also include our Second Annual Vendor and Graduate School Fair concurrent with the poster sessions to connect our student members—the future of science in Texas—with next steps in their bright young careers. And of course, we expect you will also enjoy the diverse and stimulating presentations in the Graduate Student Oral Presentation Competition, the popular Science Jeopardy, and Saturday evening's Awards Banquet featuring entertainment from UTPB's 'Ballet Forklorico'. We look forward to learning about scientific research being conducted across the Lone Star State, and socializing with new and old colleagues, collaborators, and friends.

We would not be able to hold this meeting without an amazing team of volunteers. Please join me in thanking local host Dr. Milka Montes and other members of UT Permian Basin for their hard work, hospitality, and creativity making this meeting a success. Many thanks to TAS President-elect Dr. Bob Kane, who drafted, revised, and revised again in preparation of this great program. At the end of the Awards Banquet on Saturday night, he will step into the position of TAS President. I thank Dr. Chris Vitek, TAS Coordinator of Information Technology, whose expertise and hard work were essential in preparation of this meeting. The entire TAS Board of Directors, Section Chairs, Vice Chairs, and additional volunteers did an amazing job reviewing abstracts and award nominations, and we especially thank our colleagues who will be leaving the Board of Directors at the end of this conference. Their service will be recognized at our Awards Banquet. Finally, thanks to the mentors across the state who worked with our many student authors to produce an exciting and informative slate of over 220 oral and poster presentations for this meeting.

Finally, you may have noticed recently that TAS has stepped up fundraising efforts, led by Development Chair Dr. Gerald Mulvey. Your financial support enables us to Promote STEM Excellence in Texas through student travel funding and research awards, enhanced annual meetings, and other activities across the state. We celebrate the generosity of our Bluebonnet (donations of any size), Mockingbird (gifts totaling $100-$249), Pecan Tree ($250-$999), and Lone Star (≥$1000) Donors, whose names can be found in the printed program and on the meeting app, as well as on the TAS website. A special thanks to Discover Odessa for a generous gift in support of this year's Awards Banquet. I ask all our professional members to consider making a donation at https://www.texasacademyofscience.org/donate.

On a personal note, I attended my first TAS meeting as an undergraduate nearly 20 years ago, and it has been an honor to serve you all as TAS President this year. I thank you all for your support, and I look forward to my next role as Immediate Past President and continuing to contribute to the Texas Academy of Science.

Sincerely,



Matthew A. Barnes, PhD
President, Texas Academy of Science
Associate Professor in Natural Resources Management, Texas Tech University

Development Chair Message

Welcome to the 127th Annual Meeting of the Texas Academy of Science. Last year we started planning efforts for our new development thrust to increase the recognition for our members in particularly our student members. Each of our Board of Directors contributed to a new fund drive with money collected supporting the Academy in general. This year we have initiated conference recognition for our TAS Fellows with an invitation to the Presidential Breakfast, special badge ribbons identifying them and other recognitions of their achievements. Later this year we will initiate a fundraising effort to increase the level and number of awards for top student presentations at the 2025 Annual meeting. Through this, we want to encourage all students to excel in their chosen fields and thereby increase the number and quality of STEM students entering the Texas work place. Details of the effort will be announced later this year. Enjoy the meeting and the beautiful city of Odessa, Texas.

Gerry
Gerald J. Mulvey, Ph.D., CCM
Texas Academy of Science - Member Board of Directors - Development Committee Chair

Welcome Message from Provost and Senior Vice President for Academic Affairs, The University of Texas Permian Basin

Welcome to The University of Texas Permian Basin! If this is your first time here in Odessa, I extend a warm welcome to West Texas.

Our community, university, professors, and students exude an energizing spirit that you will find invigorating. The conference committee has created thoughtful moments for interaction and discussion throughout this event. I encourage all of you to be innovative, contribute positively, and, most importantly, have fun during the next few days. This is an excellent opportunity to reconnect with old friends and colleagues and make new connections. Dr. Zobaa and Dr. Hembry have organized two exciting field trips. I recommend that you put on your boots and explore the geological history of McCamey or the hidden ecology at Urban Playa Lake.

I look forward to being inspired by you and our students as they present their research. Professors and researchers played a crucial role during my high school years, where I found my passion in chemistry. Later, my professors in graduate school became my mentors and helped guide me to who I am today. Thank you again for all you do, how you continue to push the needle in the sciences, and most importantly, how you are a mentors to our students.

I want to extend a special thank you to Dr. Milka Montes, UTPB TAS lead and academic counselor, for organizing the 127th annual meeting at UTPB!

Special thanks to the following members who made this event possible:

Committee Members:
Irene Perry – UTPB
Bob Kane – Baylor University
Christopher Vitek - UTRGV
Kathy Wood – TAS treasurer (Retired faculty University of Mary Hardin Baylor)

Supporting Faculty and Staff:
Erin Nance – UTPB
Don Bonifay – UTPB
Amanda Johnson – Discover Odessa
Kyle Beran – Angelo State University
Pat Kesavan – Midland College

Students:
Jennifer Hunt – UTPB
Evelyn Guerrero – UTPB

I hope you have an excellent and productive conference.

Best,
Raj Dakshinamurthy

Raj Dakshinamurthy, Ph.D.
Provost and Senior Vice President for Academic Affairs
Professor of Chemistry
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Odessa, TX 79761

Phone: (432) 333-7871
Fax: (432) 3337858

February 28, 2024

Texas Academy of Science
1201 W University Dr.
Edinburg, TX 78539

Dear Texas Academy of Science Attendees,

On behalf of Discover Odessa, I extend a warm welcome to the Texas Academy of Science as you convene in Odessa. It is with great pleasure that we host such a prestigious gathering of scientific minds in our vibrant community. The Texas Academy of Science plays a vital role in fostering scientific research and education, and we are honored to provide a welcoming environment for the exchange of ideas, knowledge, and collaboration among esteemed students, researchers, and science educators.

We understand the importance of your mission in advancing scientific research, education, and collaboration across disciplines. Throughout your time here, we encourage you to explore our city's treasurers, engage with our diverse community, and immerse yourselves in the endless horizons that Odessa has to offer. Whether it's savoring our authentic West Texas cuisine, discovering our cultural landmarks, or experiencing the warmth of our hospitality, we hope you find moments of inspiration and relaxation among your busy schedules.

As your hosts, we are here to ensure that your stay is both productive and enjoyable. Please do not hesitate to reach out to us if there is anything we can do to enhance your experience or if you require any assistance during your visit.

Once again, we extend our humblest welcome to you, esteemed members of the Texas Academy of Science. May your time in Odessa be filled with meaningful connections, profound insights, and genuine smiles of our residents, Odessa welcomes you with open arms and a sincere heart.

Warm regards,

Discover Odessa

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Francisco Gonzalez-Lima
The University of Texas at Austin

President
Matthew Barnes
Texas Tech University

President Elect
Bob Kane
Baylor University

Vice President
Maria Burns
University of Houston

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

Collegiate Academy Counselor
Milka Montes
University of Texas Permian Basin

Collegiate Academy Co-Counselor
Karen Grant
Univ. of Mary Hardin-Baylor

Chair, Board of Development
Gerald Mulvey
Nighthawk Weather LLC

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Jennifer Hunt
University of Texas Permian Basin

2024-2026 Student Representative
Kristen Collier
Angelo State University

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Christopher Ritzi
Sul Ross State University

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2024 Local Host
Milka Montes
University of Texas Permian Basin

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

Graduate Academy Counselor
Travis LaDuc
University of Texas at Austin

Managing Editor of TJS
Jason L. Locklin
Temple College

AAAS Representative
Sandra West Moody
Texas State University

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2022-2025 Non-Academic Director
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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

New Texas Academy of Science Officers

Vice President
Craig Younce
Hardin-Simmons University

Dr. Craig Younce earned his Ph.D. in Biomedical Science at the University of Central Florida. After earning his Ph.D., Dr. Younce continued his postdoctoral work at Sanford Burnham Prebys Medical Discovery Institute. Today, he currently serves as an associate professor and chair of the biology department at Hardin-Simmons University. Dr. Younce joined the Texas Academy of Science in 2014, shortly after his move to Texas. In 2016, he served as the Vice Chair of the Cell and Molecular Biology Section. In 2017, he served as Chair of the same section. He also served as local host and is serving this year as Vice-Chair of the Cell and Molecular Biology section. Dr. Younce is highly supportive of the mission of the Texas Academy of Science and is passionate about guiding students to careers in research.

Dr. Younce's current research focuses on a protein called regnase-1, which is involved in inflammation, cell death, and cell differentiation. He is currently interested in understanding this protein's role in the pathogenesis of hemorrhagic stroke. His previous work on regnase-1 looked at its role in heart disease and obesity. Other areas of research interest include understanding the cardioprotective effects of GLP-1 receptor activation on diabetic cardiomyopathy and myocarditis. Dr. Younce has numerous journal publications and has presented his work at both the American Heart Association's and the American Diabetes Association's Scientific Sessions.

Dr. Younce oversees undergraduate research projects and frequently takes students to the Texas Academy's Scientific conference. He is an adamant supporter of science education globally, twice taking students to Zambia in partnership with a local orphanage. He believes that a strong science foundation begins early on in a child's education and hopes that it can persist throughout their lives. Dr. Younce is devoted to serving the scientific community in any way and looks forward to his continued involvement in helping to achieve the mission of the Texas Academy of Science.

Corresponding Secretary
Louise Liu
UT Rio Grande Valley

Dr. J. Louise Liu was promoted to Full Professor in 2016 at TAMU-Kingsville and is affiliated with the TAMU Energy Institute. Her research focuses on nanostructured design and evaluation of materials used for alternative energy and biological science. She is a certified ACS career consultant and was elected Fellow of the American Chemical Society, Fellow of the Royal Society of Chemistry, and Linnean Society. She received the Distinguished Services Award by the ACS ENFL division. She was named the Year of Women by the TX Diversity Council and Distinguished Women in Chemistry or Chemical Engineering by the International Union of Pure and Applied Chemistry. Currently, she was elected as the Councilor of the Energy and Fuels Division (ENFL), the Chair of South Texas Local Chapter, ACS. She has authored and co-authored about 160 peer- reviewed publications, books, and book chapters. She chaired and organized international conferences and presented more than 180 talks at professional conferences.

AAAS Representative
Andre Felton
UT San Antonio

I am a current doctoral candidate in the Integrative Biology department at the University of Texas – San Antonio working under Dr. Jeffrey Hutchinson. Prior to the doctoral program at UTSA, I received a B.S. in Environmental Science from the University of Maryland, Baltimore County, and a M.S. from Towson University in Organismal Biology. During my academic tenure, I have had the opportunity to collaborate with the Smithsonian researchers focused on various anthropocentric topics in terrestrial and freshwater ecology. Furthermore, I have worked with researchers at University of Maryland, Baltimore County (UMBC), Towson University, University of Connecticut (UCONN), and the Ohio State University on research ranging from freshwater invertebrates, removal of invasive floral communities from the northeastern United states, small mammals community dynamics of Appalachia, to mesopredator reintroductions and trophic cascades in Ohio, and a myriad of other studies revolving around direct and/or indirect effects of anthropogenic activity on biodiversity. Currently, I have had the fortune to work with a leading scientist in ephemeral freshwater systems and develop/conduct research aimed at understanding environmental and biological threats of microplastic pollution. I currently serve as a full- time faculty instructor with Alamo Colleges in San Antonio and was awarded the NISOD Teaching award and the NVC Excellence in Teaching award. I am passionate about research to understand current and future biodiversity trends and getting undergraduate students involved with the scientific community. My hope is to share that passion with minority-dominant communities and diversify the natural sciences. Texas Academy of Science is an organization that truly aims to exposure undergraduates to, and engage undergraduates with, the larger scientific community.

2024-2027 Academic Director
Lance English
Temple College

Lance English is an Assistant Professor of Chemistry at Temple College where his dedication to student success and active curriculum development is on display at both the local and national level. He is one of twelve inaugural members of the American Chemical Society Two-Year Community of Practice, a national group working to create active learning modules for community college chemistry courses. He is a member of the Temple College Curriculum Committee and has received two internal microgrants to facilitate the development of CHEM1407 (Intro to Forensic Chemistry) and to develop open education resources for General Chemistry.

Mr. English is also an active member of the Temple College Undergraduate Research Experience program, where he has mentored three students, with the most recent student continuing her project after transferring to a four-year university. His research interests include chemistry education and the chemistry of intrinsically disordered protein regions, including predictive structure models and their role in liquid-liquid phase separation.

Mr. English holds a Master of Science in Biochemistry and is on track to complete his Ph.D. in Aquatic Resources in 2025, both from Texas State University. Before coming to Temple College, he was an adjunct faculty member at the University of the Incarnate Word where he taught the second half of General, Organic, and Biochemistry for nursing majors and redesigned the Introductory Biochemistry Laboratory to include a larger focus on protein purification and data analysis.

Texas Academy of Science 2024 Awardees

Outstanding Texas Educator
Ms. Krystle Moos

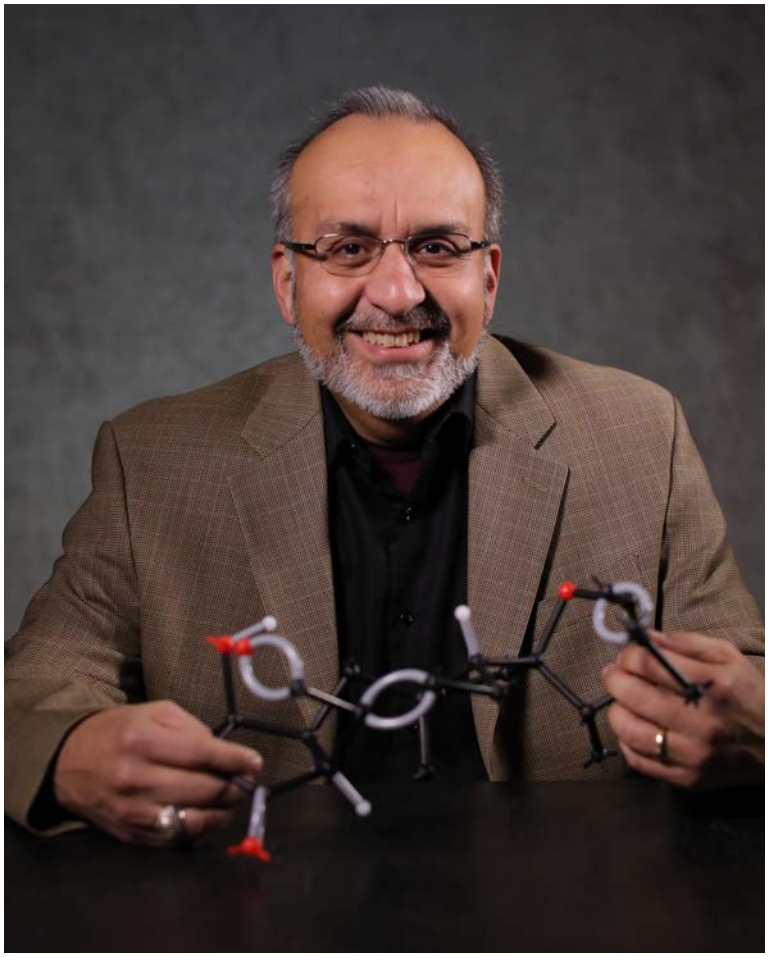
After earning a Bachelor of Arts in Biology from Hartwick College located in Oneonta, NY in 2007, Krystle Moos obtained a Texas alternative teaching certification to teach science in Texas. She has taught a variety of science courses at the secondary level during the past 16 years in the classroom with a high emphasis on making content relatable and applicable for each student. She is a National Board Certified Teacher at Midway High School in Waco, TX, teaching chemistry and AP chemistry. She also has acted as the UIL Science coach for the past 5 years, with student appearances at the state level the past 2 years.

Krystle mentors pre-service teachers through the Professional Development School partnership with Baylor University and is a teacher leader for a free professional development program offered to AP Chemistry teachers called APTeach helping to showcase strategies to improve student learning. In December 2024, she completed her Master of Arts in School Leadership from Baylor University to develop skills as a classroom teacher leader to support fellow educators.

In October 2023, Krystle was selected as a Texas state finalist for the Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST). Seven teachers in 6-12 mathematics and sciences were selected for this honor, which is the most prestigious award for K-12 science and math teachers in the United States. Additional awards and recognition include: Texas Region 12 Teacher of the Year, Midway ISD Teacher of the Year, and Associated Chemistry Teacher of Texas 2022 Guest Speaker.

Texas Academy of Science 2024 Awardees

Distinguished Texas Scientist
Dr. Daniel Romo



Daniel Romo, Ph.D., is a second-generation Mexican-American who has been blessed, along with his wife Laura, to parent 5 unique, beautiful boys: Matthew, Zachary (an Aggie), Nathan (a Baylor Bear), Jedidiah (an Aggie), and an 'adopted' son, Bryan. Romo is the Schotts Professor of Chemistry at Baylor University and co-Director of the Baylor Synthesis and Drug-Lead Discovery Laboratory. Romo received his B.A. degree in chemistry/biology from Texas A&M in 1986 and a Ph.D. in Chemistry from Colorado State in 1991. After a American Cancer Society Postdoctoral Fellowship with Prof. Stuart L. Schreiber at Harvard from 1991-1993 he returned to Texas A&M as an Asst. Professor and was promoted to Assoc. Professor in 1999, Professor in 2003, and then given the Gradipore Chair in 2014. In Fall 2010, he established the Natural Products LINCHPIN Laboratory and in Summer 2011, he initiated the TAMU Undergraduate MiniPharma Research Program. He has had the pleasure of mentoring 40 Ph.D. students, 9 M.S. students, 35 post-doctoral researchers, and >150 undergraduate researchers. In June 2015, he joined Baylor University where he established, with Prof. John Wood, the Baylor Synthesis and Drug-Lead Discovery Laboratory and in 2016 he started the Baylor Undergraduate MiniPharma (http://sites.baylor.edu/minipharma/). His research group's primary research interests include:

- Pharmacophore-Directed Retrosynthesis Applied to Bioactive, Marine Natural Products
- Asymmetric Synthesis, Novel Transformations, and Activity-Based Profiling of Beta-Lactones
- Novel Organocascade Processes Involving Unsaturated Acylammonium Salts
- Methods for Conversion of CO_2 to Beta-Lactones Involving Photocatalysis and Flow Chemistry

Romo's recent awards include a Baylor Outstanding Faculty Res. Award (2021) and selection as a Research Exemplar: P.I. Program (2017). In 2009, he received a 10-year National Institutes of Health (NIH) Method to Extend Research-In-Time Award (MERIT Award) and in 2019 a 5-year MIRA Award. He is a regular NSF reviewer, served 4 years on the NIH Syn & Biol Chem Study Sections, served on the Board of Scientific Counselors for NCI at NIH, and was a Commissioning Editor for Natural Product Reports. Romo has 10 issued patents focused on novel composition of matter and methods of use of natural products for therapeutics and diagnostics, and has been recognized for 'Excellence in Innovation' for his interest in advancing basic findings to potential human therapies primarily for cancer.

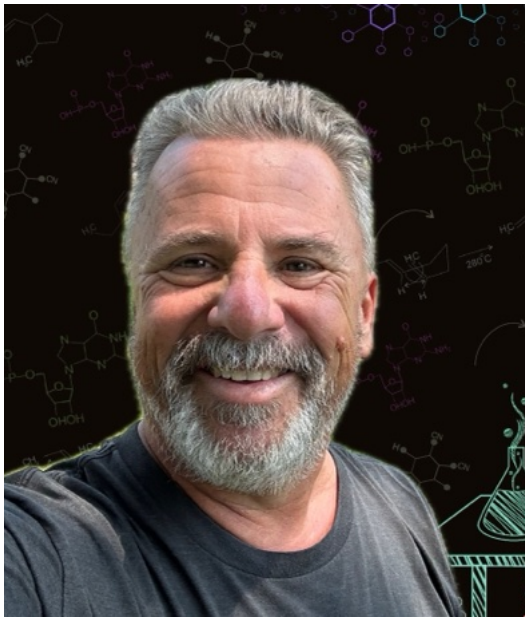
Texas Academy of Science 2024 Fellows

Dr. Matthew A Barnes

As a child, Dr. Matthew Barnes enjoyed flipping over rocks to catch bugs in the creeks of his hometown in Plano, Texas. He later discovered a more scholarly approach to aquatic ecology and studying human interactions with their environment as an undergraduate at Southwestern University, earning a B.A. in biology with a minor in sociology. Barnes earned his PhD studying aquatic invasions at The University of Notre Dame, then he returned to Texas in 2014 to begin a position within The Department of Natural Resources Management at Texas Tech University. Now an Associate Professor at Texas Tech, Barnes' research program focuses on the ecology of environmental DNA (eDNA) and eDNA applications to improve fundamental ecological understanding about the distribution and dispersal of species, primarily in freshwater ecosystems. Barnes is a member of the Texas Tech University Teaching Academy and enjoys sharing his research with students in the classroom, and his recently taught courses include Introduction to Freshwater Ecology, Quantitative Methods in Natural Resources Management, and Natural Resources Policy for both undergraduate and graduate students.

Barnes has been involved with the Texas Academy of Science for almost two decades, delivering his first ever conference presentation at the 2006 meeting at Lamar University. His first external grant was a $750 Research Award at that same meeting. Barnes has since served as Chair of the Freshwater Science Section from 2018-2021 before joining the Executive Board as Vice President in 2021, followed by terms as President-Elect and President, and he looks forward to completing this sequence serving a term as Immediate Past President beginning after this year's meeting.

Dr. Bob Kane



Bob Kane is Professor of Chemistry & Biochemistry and Director of the Institute of Biomedical Studies at Baylor University. Bob attended Texas Lutheran College (TLC; now Texas Lutheran University), where he had the opportunity to perform research with Preston Reeves. His PhD studies were with Robert Walkup at TTU in total synthesis and synthetic methodology. Upon earning the PhD he moved to UCLA for postdoctoral work with MF Hawthorne, where he ignored the boron clusters he incorporated into large organic oligomers and attached to antibodies.

Bob joined the faculty at Baylor University in 1996, where he is Professor of Chemistry & Biochemistry and Director of the Institute of Biomedical Studies. He has published 59 papers and has seven issued patents, and has mentored 12 PhD and 5 MS graduates as well as over 50 undergraduate researchers. He also initiated and organized the Baylor University Advanced Instrumentation Workshop, hosting 549 students and 143 faculty from 52 unique schools over 14 years at the annual workshop at Baylor. He presently serves as the President-elect of the Texas Academy of Science and is the General Chair for the upcoming Southwest Regional ACS meeting (SWRM) to be held October 20-23 in Waco, TX.

B.S. Texas Lutheran College - 1987
Mentor - Dr. Preston Reeves

Ph.D. Texas Tech University - 1990
Mentor - Dr. Robert Walkup

Postdoc UCLA - 1991-1996
(NIH Fellow - 1992-1995)
Mentor - Dr. M. Frederick Hawthorne

TAS Awards Banquet Agenda

7:00 – 10:00 pm Saturday, March 3, 2024
MCM Grande Hotel & Fun Dome

Welcome from TAS	*Dr. Matthew Barnes, TAS President*
Welcome from the Local Host	*Dr. Rajalingam Dakshinamurthy, Provost, University of Texas Permian Basin*
Entertainment	*UTPB Ballet Folklorico*
Outstanding Texas Educator Award Distinguished Texas Scientist Award Recognition of new TAS Fellows	*Dr. Kathleen Wood, TAS Treasurer*
Undergraduate Poster Awards Undergraduate Oral Presentation Awards	*Dr. Milka Montes, Collegiate Academy Counselor*
Sammy Ray Marine Science Award	*Dr. Stephanie Lockwood, Marine Science Chair*
Amir-Moez Award for Excellence in Mathematics	*Dr. Angela Brown, Mathematics & Computer Science Section Chair*
Graduate Student Presentation Competition Awards Student Research Grants	*Dr. Travis LaDuc, Graduate Academy Counselor*
Recognition of Outgoing Board Members Recognition of New Board Members Introduction of New TAS President	*Dr. Matthew Barnes, TAS President*
Closing Remarks	*Dr. Robert Kane, Incoming TAS President*

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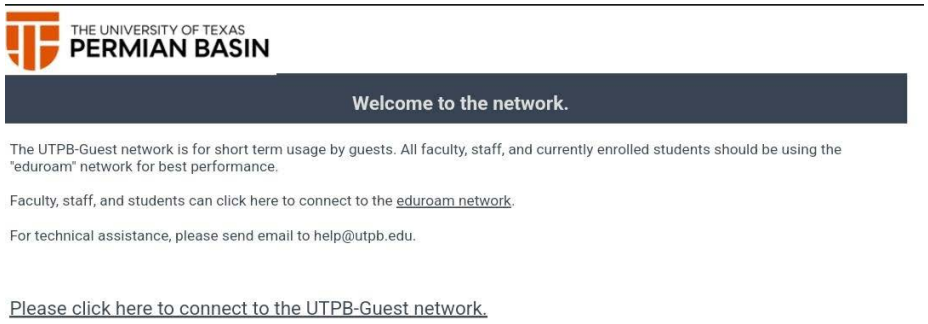

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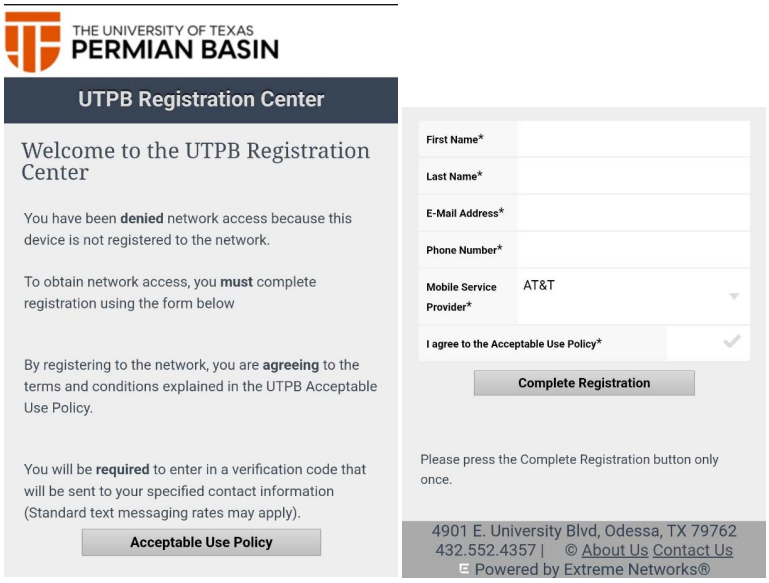
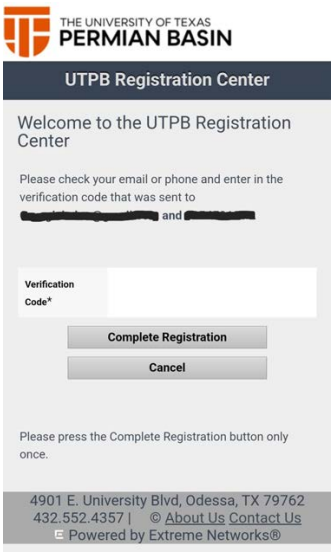


Click Complete Registration



You should get a verification code sent to the provided phone number and/or email. (check both, since there's sometimes a delay with text messaging).

Enter the provided verification code in the new page that appears, and click Complete Registration.

Want a T-Shirt?

Donate $20 and get a t-shirt!

DETAILED SCHEDULE

Thursday/Friday - DETAILED SCHEDULE

Thursday, 29 February

8:30am **Field Trip 1: The geologic history and fossil content of the Lower Cretaceous strata exposed southwest of McCamey, Texas**
Meet in Mesa Building main parking lot

Friday, 1 March

7:30am **Board of Directors Meeting**
MB 2104C
Chaired by: Matthew A. Barnes

10am **Set-up Posters**
Library Event Studio

10am **Student Mixer**
Library Foyer

10am **Registration**
MB Registrar's Foyer

11am **Section Chairs Meeting**
MB 2110

12:30pm **Freshwater Science A**
MB 2260
Chaired by: Mary Johnston and Cynthia Bashara

12:30pm **Jumping in the deep end: quantifying environmental DNA concentrations of Pomacea maculata at varying depths in a South Austin pond**
» Cassidy Reynolds[1], Esmeralda Rosas[1], Dave Christie[2], Matthew A. Barnes[3], Romi Burks[1] (1. Southwestern University, 2. Meridian Community, 3. Texas Tech University)

12:45pm **Plastisphere Freshwater Migration: The spatiotemporal remobilization of microplastics across two IRES Watersheds.**
» Andre Felton[1], Salem Farner[1], Sue Ellen Huerta[1], Briaunna Zamarripa[1], Beauxregard Martinez[1], Maddison Orquiz[1], Jeff Hutchinson[2] (1. The University of Texas at San Antonio, 2. University of Texas at San Antonio)

1pm **Microplastics Analysis in Surficial Sediments along the Brazos and Bosque Rivers, McLennan County, Texas**
» Annie Mowry[1], Morena Flores[1], Ethan Villa[1], Cambria Blanton[1], Rebecca Barboza[1], Caden Helona[1], Gloria Dominguez[1], Sara Victoria[1], Stephanie Lockwood[2], Stephanie Randell[1] (1. McLennan Community College, 2. Texas Tech University)

1:15pm **Out of the frying pan and into the freezer: sex differences in thermal tolerance of livebearing species**
» Sophia McKelvey[1], Allison Davis[1], Michael Ryan[1] (1. University of Texas at Austin)

1:30pm **Fear of extinction: neophobia as a possible mechanism for the maintenance of an asexual-sexual fish system**
» Ash Romero[1], Aayush Srivatsa[1], Allison Davis[1], Michael Ryan[1] (1. University of Texas at Austin)

1:45pm **Telling a snail's tale: assessment of eDNA analysis as a tool to monitor removal efforts of Pomacea maculata in South Austin.**
» Esmeralda Rosas[1], Cassidy Reynolds[1], Dave Christie[2], Matthew A. Barnes[3], Romi Burks[1] (1. Southwestern University, 2. Meridian Community, 3. Texas Tech University)

2pm **Factors Influencing Microbial Diversity within an East Texas Fluvial Network**
» Max Lannom[1], James Harper[1], Aaron Lynne[1], Amber Ulseth[1] (1. Sam Houston State University)

Continued from **Friday, 1 March**

12:30pm **Cell & Molecular Biology**
MB 2270
Chaired by: Adriana Visbal and Craig Younce

12:30pm **The Significance of Glucose Concentration on Bacterial Biofilm Formation**
» Ravyn Solis[1], Bidisha Sengupta[1] (1. Department of Chemistry and Biochemistry, Stephen F Austin State University)

12:45pm **Extracellular Matrix Derived from Mesenchymal Stem Cells Drives Contraction in a Wound Model**
» Leila Martinez[1], Kayla Bayless[1], Carl Gregory[1], Colette Abbey[1] (1. Texas A&M Health Science Center, College Station)

1pm **Drinking Water Contaminant Mixtures: Exposure to Lead, Copper, and Glyphosate**
» Clancy Collom[1], James Liu[1], Christie Sayes[1] (1. Baylor University)

1:15pm **The Effect of Sodium Butyrate on PA28y in Triple-Negative Breast Cancer Cells**
» Natalia Bowman[1], Kelly Reed[1] (1. Austin College)

1:30pm **Investigating PA28y's Role in Angiogenesis Through Regulation of the PKA Pathway**
» Riley Cregg[1], Kelly Reed[1] (1. Austin College)

1:45pm **Investigating Cancer-Associated Proteins During Hibernation in the Thirteen-lined Ground Squirrel**
» Danya Van Vuuren[1] (1. Austin College)

12:30pm **Chemistry & Biochemistry A**
MB 3261
Chaired by: Darrell Fry and Bidisha Sengupta

12:30pm **Non-covalent Interactions in Molecular Design for Sensing Toxic Analytes**
» RASHID MIA[1] (1. Stephen F. Austin State University)

12:45pm **Molecular Modeling of bioactive components of Lycium Ruthenicum with COX2**
» Kista Franco[1], Chao Dong[1], Marisol Fierro[1] (1. University of Texas Permian Basin)

1pm **Analysis of East Texas landfowl and waterfowl egg shells**
» Crystal Davis[1], Alyx Frantzen[1], Franta Majs[2] (1. Stephen F. Austin State University, 2. Louisiana State University)

1:15pm **Developing a Chromatographic System for Detecting RNA-Cholesterol Adducts**
» Rachel Tonne[1], Tristin Laughlin[2], Craig Younce[2], Godwin Ananaba[3], Godwin Ifere[2] (1. Hardin-Simmons University, 2. Hardin Simmons University, 3. Clark Atlanta University)

1:30pm **Quantification of Biodiesel Mixtures from Hickory Kernel Oil**
» Sydni Sheffield[1], Russell Franks[1] (1. Stephen F. Austin State University)

1:45pm **Influence of Perlite-Biosolid composition on Growth and Uptake of Cd and Mn by radish (Raphanus sativus L.) under Greenhouse conditions**
» Kefa onchoke[1] (1. Stephen F. Austin State University)

2pm **Composition and analysis of Maya pottery sherds from Guatemala**
» Madison McFarland[1], Kefa onchoke[1] (1. Stephen F. Austin State University)

2:15pm **Determining Siginificant Parameters for Bioprinting PLGA Nanoparticle-laden Biomaterial Inks**
» Noor Nazeer[1], Sabrina Woodward[1], Gabriela Hislop Gomez[1], Cody Crosby[1], Kristie Cheng[2], Noah Pyles[1], Ananya Datta[3], John Clegg[3] (1. Southwestern University, 2. The University of Texas at Austin, 3. The University of Oklahoma)

Friday - DETAILED SCHEDULE

Continued from **Friday, 1 March**

12:30pm **Anthropology & Geosciences**
MB 3269
Chaired by: Stephanie Baker and Theresa De Cree and Michael Read and Mindy Faulkner

12:30pm **A Survey of Orthopedic Medical Devices and the Degree of Osseointegration in a Modern Skeletal Collection**
» Theresa De Cree[1], Daniel Wescott[1] (1. Texas State University)

12:45pm **The Morphology of Cranial Ballistic Trauma: Twelve Case Studies**
» Stephanie Baker[1], Hailey Collord-Stalder[1], Anna Maier[1], Mara Stumpf[1], Timothy Campbell[2], Patrick Lewis[3], Michelle Hamilton[1] (1. Department of Anthropology, Texas State University, 2. Department of Anatomy, Midwestern University, 3. Department of Biology, Sam Houston State University)

1pm **Analysis of humeral robusticity in individuals with unilateral septal apertures**
» Timothy Campbell[1], Stephanie Baker[2] (1. Department of Anatomy, Midwestern University, 2. Department of Anthropology, Texas State University)

1:15pm **Karst Phenomena and Speleogenesis of Devil's River State Natural Area**
» Kevin Stafford[1], Mindy Faulkner[1] (1. Stephen F. Austin State University)

1:30pm **Orientation and Significance of Ripple Marks in the Hickory Sandstone along Crabapple Creek, Gillespie County, Texas**
» R. LaRell Nielson[1], Andrew Henry[2], Taylor Carranza-Watson[1] (1. Stephen F. Austin State University, 2. Angelina and Nateches River Authority)

1:45pm **Patterns of Morphological Variation in the Dentition of Neotoma and Its Consequences for Interpreting the Fossil Record**
» Stacie Skwarcan[1] (1. The University of Texas at Austin)

12:30pm **Terrestrial Ecology and Management**
MB 4250
Chaired by: Sara Joseph and Richard Patrock

12:30pm **Tardigrades on Quercus virginiana: A Distribution Analysis**
» Angel Flowers[1], Matthew Hoch[1], William Miller[2] (1. Lamar University, 2. Baker University)

12:45pm **Structure of a plant-pollinator network at an urban wetland preserve in Midland, Texas**
» Evelyn Guerrero[1], Emilia Gutierrez[1], Chelsea Rodriguez[1], Sarai Badillo[1], Jackie De Santiago[1], Kaylee Garcia[1], Jennifer Hunt[1], Jacquelyn Lopez[1], Jeff Brown[1], Calli Davis[1], Alexis Morales[1], Alondra Pando[1], Jose Zapata[1], Zacharie Yandell[1], Daniel Garcia[2], Maggie Bullard[1], Shaun McCoshum[3], Erica Newman[4], David Hembry[1] (1. University of Texas Permian Basin, 2. Texas Tech University, 3. University of North Texas, 4. University of Texas at Austin)

1pm **Evaluating patterns of red-spotted toad occurrence and reproduction in a dynamic desert system**
» Sadie Roth[1], Matthew A. Barnes[1], Kerry Griffis-Kyle[1] (1. Texas Tech University)

1:15pm **Changes in Avian Community Structure Following Prescribed Thinning of Pinyon-Juniper Woodlands in New Mexico**
» Adam Cupito[1], Lucas Schilder[1], Ariana Rivera[1], Clint Boal[2] (1. Texas Tech University, 2. Texas Cooperative Fish and Wildlife Research Unit - Texas Tech University)

1:30pm **The Occurrence of Microplastics Within Differently Aged Forest Stands**
» Maddison Orquiz[1] (1. University of Texas at San Antonio)

Continued from **Friday, 1 March**

1:45pm **Limno-terrestrial tardigrades from lichen habitats on Quercus virginiana trees at different exposures to sea salt aerosols in Southeast Texas**
» Philippine Brossard[1], Matthew Hoch[1], Angel Flowers[1] (1. Lamar University)

2pm **Streamlining workflows and generating interactive risk maps for mosquito borne diseases in Connecticut, USA.**
» Jerry Champion Jr[1], Joseph McMillan[1], Philip Armstrong[2] (1. Texas Tech University, 2. Connecticut Agricultural Experiment Station)

2pm **Cell & Molecular Biology Section Meeting**
MB 2270
Chaired by: Adriana Visbal and Craig Younce

2pm **Anthropology & Geosciences Section Meetings**
MB 3269
Chaired by: Stephanie Baker and Theresa De Cree and Michael Read and Mindy Faulkner

2:15pm **Freshwater Science Section Meeting**
MB 2260
Chaired by: Mary Johnston and Cynthia Bashara

2:15pm **Terrestrial Ecology and Management Section Meeting**
MB 4250
Chaired by: Sara Joseph and Richard Patrock

2:30pm **Coffee Break**
MB Foyer (2nd/3rd/4th floors)

3pm **Plant Biology & Systemics & Evolutionary Biology**
MB 2260
Chaired by: David Lemke and Joshua Brokaw and Matthew Greenwold and Thornton Larson

3pm **Structure of Extrafloral Nectaries in Cactaceae**
» Jackson Burkholder[1], David Lemke[1] (1. Department of Biology, Texas State University)

3:15pm **Grey Oak Mortality and an Updated Flora of Sul Ross's Hancock Hill**
» Benjamin Thomas[1], Christopher Ritzi[1] (1. Sul Ross State University)

3:30pm **Relationships among functional leaf traits in multiple grass species accounting for phylogenetic relatedness**
» Carlina Schubert[1], Michael Tobin[1], Tam Hoang[1] (1. University of Houston - Downtown)

3:45pm **The stability of epigenetic variants that can act as loci causing phenotypic change**
» Raul Faburrieta[1] (1. The University of Texas at Tyler)

4pm **Coevolution of a predominantly tropical insect-plant symbiosis at its northern range margin in Texas**
» David Hembry[1], Chelsea Rodriguez[1], Sarai Badillo[1], Evelyn Guerrero[1], Emilia Gutierrez[1], Jennifer Hunt[1], Zacharie Yandell[1], Joshua Fowler[2], Jesse Duarte[3], Erica Newman[4] (1. University of Texas Permian Basin, 2. University of Miami, 3. University of Arizona, 4. University of Texas at Austin)

4:15pm **Readily available market noni juice does not evoke an equivalent aversive response in Drosophila simulans when compared to noni fruit in the wild**
» Kyle Smith[1], Yuanyuan Kang[1] (1. University of Houston-Downtown)

Friday - DETAILED SCHEDULE

Continued from **Friday, 1 March**

3pm Biomedical Sciences

MB 2270

Chaired by: Nicole Poritsanos and Joni Ylostalo

3pm **Creating a hydrogel that mimics the physical and chemical characteristics of the extracellular matrix (ECM) of brain parenchyma.**
» Gabriela Hislop Gomez[1], Noor Nazeer[1], Sabrina Woodward[1], Cody Crosby[1], Ananya Datta[2], John Clegg[2], Kristie Cheng[1], Noah Pyles[1] (1. Southwestern University, 2. The University of Oklahoma)

3:15pm **Study of the Forces Around the Knee During a Lateral Jump in Female Athletes**
» Cal Harper[1], Ariful bhuiyan[2], William Amonette[1], Wendy Cardenas[3], Sascha Henderson[1] (1. University of Houston Clear Lake, 2. University of Houston - Clear lake, 3. University of Houston Clear lake)

3:30pm **Detection of SARS-CoV-2 Spike Protein Sequence Haplotypes Among Non-symptomatic Individuals During the COVID-19 Pandemic**
» Joshua Brokaw[1], Elizabeth Crawford[1], Rebecca Hunter[1], Qiang Xu[1], Emily Bailey[2] (1. Abilene Christian University, 2. Campbell University)

3:45pm **Designing a Multicomponent Hydrogel to Mimic the Physical and Chemical Properties of the Human Brain Parenchyma**
» Sabrina Woodward[1], Noor Nazeer[1], Gabriela Hislop Gomez[1], Kristie Cheng[1], Noah Pyles[1], Ananya Datta[2], John Clegg[2], Cody Crosby[1] (1. Southwestern University, 2. The University of Oklahoma)

4pm **Analysis of Phytochemicals in Watercress Leaves**
» Allyssa Fisher[1], Bidisha Sengupta[1], James Villanueva[1] (1. Stephen F. Austin State University)

3pm Chemistry & Biochemistry B

MB 3261

Chaired by: Bidisha Sengupta and Darrell Fry

3pm **There is no I in Redox: Design Principles for Cooperativity in Redox Processes**
» Mariona Garcia Dalmases[1], Courtney Young[1], Alexis Telford[1], Emily Ah Leong[1], John Gary[1] (1. Stephen F. Austin State University)

3:15pm **It Takes Two to Tango: Redox Interplay with Amino Acid Models**
» Courtney Young[1], Mariona Garcia Dalmases[1], Alexis Telford[1], Emily Ah Leong[1], John Gary[1] (1. Stephen F. Austin State University)

3:30pm **Coumarin-enamine double-ESIPT Fluorescent Probes for Multi-analytes Detection**
» Blake Maillet[1], Jack Weeks[1], RASHID MIA[1] (1. Stephen F. Austin State University)

3:45pm **Synthesizing Frameworks to Catch Fission Fragment**
» Victoriano Cooper[1], Diego Zometa[2] (1. Howard Payne University, 2. Abilene Christian University)

4pm **Relevance of three-dimensional inorganic coordination networks as potential nuclear waste matrices**
» Ralph Zehnder[1] (1. Angelo State University)

4:15pm **Aerosolizing Molten Salt for Quantitative and Qualitative Analysis**
» Evan Babb[1], Sydney Ervin[1], Alli Mae Berry[2], Dr. Kim Pamplin[2] (1. Abilene Christian University, 2. Nuclear Energy eXperimental Testing Lab)

4:30pm **Advancing Climate Resilience through Sustainable Hydrogen Production in South Texas**
» Jingbo Liu[1], Sajid Bashir (LIU)[1] (1. Texas A&M University-Kingsville)

Continued from **Friday, 1 March**

3pm STEM Education A

MB 3269

Chaired by: Lockwood Cox and Felix Greco

3pm **Texas Experiential Learning and Scholarship Program for Food and Agricultural Science Training Program (TExAS FAST) – Year 1**
» Briana Salas[1], Adam Bynum[1] (1. Our Lady of the Lake University)

3:15pm **Student outcomes after participation in undergraduate research experiences in nano-enabled agriculture.**
» Illya Medina Velo[1] (1. Western New Mexico University; Houston Christian University)

3:30pm **The Grand Staircase-Escalante National Monument as a Tool for Undergraduate Research**
» Mindy Faulkner[1], Melanie Ertons[1], Barbie Adams[1], Eri Kawamura[1] (1. Stephen F. Austin State University)

3:45pm **From Data to Degree: Empowering Institutions to Support Student Success through Artificial Intelligence**
» Dipak Singh[1], Keith Hubbard[1] (1. Stephen F. Austin State University)

4pm **Ethics: Generative AI in Science Education**
» Gerald Mulvey[1], James Mulvey[2] (1. Nighthawk Weather LLC, 2. Nigthhawk Weather LLC)

4:15pm **EcoJEDI Summer Research Program in Agricultural Sciences - Year 2**
» Briana Salas[1], Jeff Hutchinson[2], Vikram Kapoor[2], Laura Perry[3], Gwen Young[2], Sue Hum[2], Jamie Crosswhite[1] (1. Our Lady of the Lake University, 2. University of Texas at San Antonio, 3. Northeast Lakeview College)

4:30pm **Outreach in Southwest Texas for Increasing STEM Education Interest**
» Angela Brown[1], Jennifer Miller-Ray[1] (1. Sul Ross State University)

4:45pm **Blending the cultural spheres of science and art**
» Seena Mathew[1], Stephanie Chambers[1] (1. University of Mary Hardin-Baylor)

4:15pm Biomedical Sciences Section Meeting

MB 2270

Chaired by: Joni Ylostalo and Nicole Poritsanos

4:30pm Plant Biology + Systemics & Evolutionary Biology Section Meetings

MB 2260

Chaired by: David Lemke and Joshua Brokaw and Matthew Greenwold and Thornton Larson

4:45pm Chemistry & Biochemistry Section Meeting

MB 3261

Chaired by: Darrell Fry and Bidisha Sengupta

Friday - DETAILED SCHEDULE

Continued from **Friday, 1 March**

5:30pm **Poster Session A**
Library Event Studio

P1 - An extended standard of processing procedures prepares undergraduate volunteers and attempts to increase overall efficiency
» Bec Krolczyk[1], Stephanie Baker[1], ChristiAna Dunham[1], Michelle Hamilton[1] (1. Department of Anthropology, Texas State University)

P4 - Relative Importance of Risk Factors in COVID-19 Hospital Mortality
» ADESEYE OGUNDELE[1], Abraham Akiyode[1], Aminat Akinfolarin[1], Olayide Dipeolu[1], John Garza[2] (1. The University of Texas, Permian Basin, 2. UTPB)

P7 - The Pharmaceutical Compounds of Yucca Filamentosa
» Elise Jones[1], Kamryn Kershaw[1], Irene Perry[1] (1. The University of Texas, Permian Basin)

P9 - Evaluating the efficacy of pine oil and lemon oil as biosafe alternatives to xylene in histological staining
» Elizabeth Snoddy[1], Stephanie Wolff[1], Christina Nguyen[1], Adriana Visbal[1] (1. University of Houston - Downtown)

P11 - Bioinformatic Analysis of Short-Chain Fatty Acid Receptors and Transporters: Implications for Primary Open-Angle Glaucoma
» Lars Schnell[1], Gen Kaneko[1], Humberto Hernandez[1] (1. University of Houston-Victoria)

P12 - Evaluation of heavy metals in selected brands of baby foods in the United States.
» Omobolanle David Garuba[1], Ayodotun Sodipe[1], Shodimu-Emmanuel Olufemi[1], Judith Anglin[2], Sonya Good[1], Olubukola Oyawoye[3] (1. Texas Southern University, Houston, Texas, 2. University of District of Colombia, Washington DC, 3. Federal University, Oye, Ekiti)

P16 - Exploring the Effects of Artificial Sweetener on Stem Cells
» McKenna Fant[1] (1. Angelo State University)

P18 - Measuring the Effectiveness of Different Produce Cleansers on Organically Grown Versus Conventionally Grown Produce
» Isabel Clevenger[1] (1. Howard Payne University)

P20 - An application of alternative methods for toxicity assessment of e-liquid binary mixtures
» Yanira Baldovinos[1], Precious Obiako[1], Clancy Collom[1], Christie Sayes[1] (1. Baylor University)

P22 - A High-Cholesterol Diet in Drosophila melanogaster Impacts the Rate at which the Cephalic Furrow Undergoes Morphogenesis
» Hailey Hawkins[1] (1. Angelo State University)

P24 - Analyzing the Gene Expression of Pre and Post Chemotherapy Treated Metastatic Triple Negative Breast Cancer Samples
» Aliyah Priestley[1], Emma Sturdivant[1], Yuliana Chavez[1], Joni Ylostalo[1] (1. University of Mary Hardin-Baylor)

P26 - Synthesis of Dimethylmalonic Acid using Potassium Permanganate under Alkaline Conditions
» Lacy Severn[1], Caitlin Rutherford[1], Rebekah Oberdick[1], Joselyn Cobb[1], Mark Haney[1] (1. Navarro College)

P28 - Development of the HK97 VLP as a Versatile Platform for Targeted Drug Delivery
» Jesie Espinoza[1], Dustin Patterson[1] (1. The University of Texas at Tyler)

Continued from **Friday, 1 March**

5:30pm **Poster Session A**
Library Event Studio

P30 - Investigations of In Vitro Disassembly and Reassembly of the HK97 Virus-Like Particle for Encapsulation of Foreign Guest Molecules
» Kevin Villeda Olmos[1], Dustin Patterson[1] (1. The University of Texas at Tyler)

P32 - Lanthanide coordination polymers with various terephthalate derivatives
» Daniel Rios[1], Emory Brandon[1], William Best[2], Ralph Zehnder[1] (1. Angelo State University, 2. Central High School)

P34 - Design and Synthesis of Double-ESIPT Fluorescent Probes for Multi-analytes Detection
» Jack Weeks[1], RASHID MIA[1], Blake Maillet[1] (1. Stephen F. Austin State University)

P36 - Thermal and Structural Analysis on Strandberg-type Polyoxometalates (POMs)
» Christopher Wright[1], Hong Young Chang[1] (1. Sul Ross State University)

P38 - Adventures in in developing a radiationless strand exchange protocol: A tween drama
» Chelsea Kelley[1] (1. Wayland Baptist University)

P40 - A Methodical Evaluation of Aidan Fruit's Antidiabetic Properties
» Malachi Farley[1], Alycia Caban-Johnson[1], Daniela Wong[1], Paul Asamoah[1] (1. Our Lady of the Lake University)

P42 - Effect of anthropogenic noise on selected mammals in an urban system
» Lilly Waddell[1], Troy Ladine[1] (1. East Texas Baptist Universtity)

P43 - Community Composition of a Mesic Edwards Plateau Cliff on Flat Rock Creek in Bosque County, Texas
» Taylor Price[1] (1. Tarleton State University)

P44 - TRENDS IN RAPTOR ADMISSIONS TO WILDLIFE REHABILITATION CENTERS ACROSS 13 YEARS IN THE SOUTHERN HIGHT PLAINS OF TEXAS
» Mackenzie Hall[1], Clint Boal[2] (1. Texas Tech University, 2. Texas Cooperative Fish and Wildlife Research Unit - Texas Tech University)

P45 - Pestalotiopsis microspora in Microgravity
» Karey Grametbauer[1], Paula Gutierrez[2], Evan Boyer[1], Bryan Nash[1], Evan Hernandez[1], Georgi Shoumaroff[1], Joanna Clayton[3], Kedaijah Evans[4] (1. STEM Academy, 2. UTPB, 3. Odessa College, 4. Baylor University)

P46 - Abundance and diversity of anurans between two anthropogenic wetland habitats on Sul Ross property.
» Sarah Jane Gilbert[1], Thornton Larson[1] (1. Sul Ross State University)

P47 - Effect of Shrub Removal on Prairie Plant Diversity
» Fernanda Gonzalez[1], Mark Gustafson[1], Alan Lievens[1] (1. Texas Lutheran University)

P48 - Detection and monitoring of cyanobacteria toxins in Texas waterbodies
» Travis Donnell[1], Ryan Shartau[1] (1. The University of Texas at Tyler)

P50 - Using Microbial Metagenomics as a Tracer for Pollution and Dominant Biogeochemical Pathways in the Edwards Aquifer Contributing Zone
» Abby Doderer[1], Allison Veach[1] (1. University of Texas at San Antonio)

Friday - DETAILED SCHEDULE

Continued from **Friday, 1 March**

5:30pm **Poster Session A**
Library Event Studio

P52 - Comparison of dry and live biofilm microplastic concentrations between permanent pools, ephemeral pools, and detention ponds in Central Texas
» Claire Littlefield[1], Jeff Hutchinson[2] (1. The University of Texas at San Antonio, 2. University of Texas at San Antonio)

P54 - Determination of seasonal variation in chemical and microbial effluent signatures in the San Antonio River Basin
» Aimee Steinbrecher[1], Fabiola Estrada Diaz Flores[2], Allison Veach[3] (1. The University of Texas at San Antonio (UTSA), School of Civil and Environmental Engineering and Construction Management, 2. San Antonio River Authority, 3. University of Texas at San Antonio)

P56 - Assessing the need to feed zebra mussels (Dreissena polymorpha) during laboratory testing studies
» Autumn Brown[1], Jacob Wilson[1], Ava Locklin[2], Pearl Patel[2], Jason Locklin[3] (1. Department of Biology, Temple College, 2. Lake Belton High School, 3. Temple College)

P58 - Adapting to the Heat: Investigating the Evolving Thermal Tolerance P58 - Limits of Zebra Mussels (Dreissena polymorpha) in Warm Texas Waterbodies
» Aiden Valdez[1], Jacob Wilson[1], Benjamin Nau[1], Jason Locklin[2] (1. Department of Biology, Temple College, 2. Temple College)

P60 - Implications for population dynamics of Texas zebra mussels (Dreissena polymorpha): Investigating the thermal tolerance limits across mussel size classes
» Jacob Wilson[1], Aiden Valdez[1], Benjamin Nau[1], Jason Locklin[2] (1. Department of Biology, Temple College, 2. Temple College)

P62 - Assessment of the current status of the Texas Hornshell, Popenaias popeii (Bivalvia: Unionidae) from the Rio Sabinas of northeastern Mexico.
» Cesar Rodriguez[1], Ned Strenth[1] (1. Angelo State University)

P64 - Presence of Batrachochytrium dendrobatidis (Bd) on amphibians and in environmental samples in west Texas
» Emerald King[1], Sadie Roth[1], Kerry Griffis-Kyle[1], Matthew A. Barnes[1] (1. Texas Tech University)

P70 - Reef Fish Assemblages of the Mesoamerican Barrier Reef in Roatán, Honduras
» Annie Mowry[1], Ashlyn Kennedy[2], Madelyn Knauss[1], Stephanie Randell[2], Morena Flores[2], Racheal Gomez[2], Matthew Hicks[2], Traesha Robertson[3], Stephanie Lockwood[1] (1. Texas Tech University, 2. McLennan Community College, 3. College of Coastal Georgia)

P71 - Abundance and Disease Status for Starlet Corals in the Bay Islands, Honduras
» Gloria Dominguez[1], Xaile Garza[1], Ana Quintinilla[1], Stephanie Lockwood[2], Matthew Hicks[1], Racheal Gomez[1], Traesha Robertson[3], Stephanie Randell[1] (1. McLennan Community College, 2. Texas Tech University, 3. College of Coastal Georgia)

P72 - Fish Diversity in Roatán, Honduras
» Morena Flores[1], Rebecca Musick[1], Jayden Crupe[1], Madelyn Knauss[2], Matthew Hicks[1], Racheal Gomez[1], Traesha Robertson[3], Stephanie Lockwood[2], Stephanie Randell[1] (1. McLennan Community College, 2. Texas Tech University, 3. College of Coastal Georgia)

P76 - Cognitive improvement and prefrontal functional connectivity in individuals with remitted bipolar disorder after transcranial infrared laser stimulation
» Douglas Barrett[1], Roger E. Davis[1], Farzad Salehpour[1], Laura A. Gamboa[1], Sarah Diaz[1], Siyan He[2], Amy Bichlmeier[2], Lucy Chibib[2], Erin Logue[2], Jennifer E. Siegel-Ramsay[2], Jessica Batten[2], Savannah Layfield[2], Jorge R. C. Almeida[2], F. Gonzalez-Lima[1] (1. The University of Texas at Austin, 2. Dell Medical School at The University of Texas at Austin)

Continued from **Friday, 1 March**

5:30pm **Poster Session A**
Library Event Studio

P77 - The Use Of Tryptophan CQDs For The Treatment Of Neurodegenerative Diseases
» Laisha Ramirez[1], Mahesh Narayan[1] (1. University of Texas at El Paso)

P78 - Citrate and Lactate Promote the Progression of Glioblastoma through Activation of Tumor Associated Macrophages
» Nikila Swaminathan[1] (1. Allen High School)

P79 - Transcranial infrared laser stimulation (TILS) improves neurocognitive performance in individuals with remitted bipolar disorder
» Roger E. Davis[1], Erin Logue[2], Siyan He[2], Lucy Chibib[2], Amy Bichlmeier[2], Farzad Salehpour[1], Sarah Diaz[1], Laura Gamboa[1], Hunter Dutkiewicz[1], Savannah Layfield[2], Douglas Barrett[1], Jennifer E. Siegel-Ramsay[2], Jessica Batten[2], Andreana Haley[2], Jorge R. C. Almeida[2], F. Gonzalez-Lima[1] (1. The University of Texas at Austin, 2. Dell Medical School at The University of Texas at Austin)

P80 - The 24 hr locomotor activity of day-night anticipation in Drosophila simulans and Drosophila sechellia
» Kennedi Landry[1], Kismely Castillo Dilone[1] (1. University of Houston - Downtown)

P81 - Dendrite structure and topography of facial motor neurons in larval zebrafish (Danio rerio)
» Kimberly McArthur[1] (1. Southwestern University)

P89 - Inhibition of albumin denaturization by Ephedra aspera and Ephedra antisyphilitica
» McKenzie McBurney[1], CHIAMAKA NWAUGO[1], Irene Perry[2] (1. University of Texas Permian Basin, 2. The University of Texas, Permian Basin)

P91 - Can seeds from different generations of Mouse Ear Thale Cress (Arabidopsis thaliana) germinate after staying dormant for 7 years and complete an entire lifecycle to produce offspring?
» Syeda MTI Sanzara[1], Kattia Palacio-Lopez[1] (1. University of Houston - Downtown)

P93 - Molecular Identification Using DNA Barcoding of Bothriochloa Specimens Collected from Guadalupe County.
» Gabriel Martinez[1], Mark Gustafson[1], Alan Lievens[1], Danielle Grove[1], Stephanie Perez[1] (1. Texas Lutheran University)

P95 - Comparative analysis of Arabidopsis thaliana from various regions under drought conditions: evidence of phenotypic plasticity
» Ivan Reyes[1], Kattia Palacio-Lopez[1] (1. University of Houston - Downtown)

P97 - Soil Water Saturation Affects Photosynthetic Characteristics of Rice
» Mitchell Ludden[1], Carlina Schubert[2], Kayla Wleczyk[1], Tam Hoang[2], Michael Tobin[2] (1. University of Houston-Downtown, 2. University of Houston - Downtown)

P113 - Understanding the distribution of the Smooth Softshell (Apalone mutica) in the Canadian River through traditional and novel survey methods
» Joshua Gonzalez[1], Drew Davis[1] (1. Department of Biology, Eastern New Mexico University)

P114 - Restoration of a spring run silted in by a dam along Honeycut Springs, C.L. Browning Ranch, Johnson City, Texas
» Jeff Hutchinson[1], Scott Gardner[2], Claire Littlefield[1] (1. University of Texas at San Antonio, 2. CL Browning Ran)

Friday - DETAILED SCHEDULE

Continued from **Friday, 1 March**

5:30pm **Poster Session A**
Library Event Studio

P116 - Isolating and Identifying Antibiotic-Producing Bacteria from TLU Soil Samples
» Kassandra Ortiz[1], Larizza Alcala[1], Ciani Sellers[1], Eduarda Stein Christ[1] (1. Texas Lutheran University)

P118 - Stability of Virginia opossum (Didelphis virginiana) population in an urban system during a 9-year period.
» Peyton Shivers[1], Troy Ladine[1] (1. East Texas Baptist Universtity)

P120 - A test of predator odor recognition in rural and urban Carolina wrens
» Kendall Kinsey[1], Anna Maloney[1], Andrea Olise[1], Korede Omoniyi [1], Diane Neudorf[1] (1. Sam Houston State University)

P122 - Tree spatial structure in a mixed conifer forest in the Sacramento Mountains of south-central New Mexico
» Dylan Jerden[1], Matthew Allen[1] (1. Wayland Baptist University)

P123 - Song dialects of the mountain chickadee (Poecile gambeli) in the sky Islands of western Texas and New Mexico
» Mary Anderson[1], Ben Skipper[1] (1. Angelo State University)

P125 - Quantification of environmental DNA (eDNA) shedding by the terrestrial lizard Sceloporus consobrinus using a CTAB-chloroform DNA extraction method
» Julianne Bullock[1], Emily Tucker[1], Vera Ye[1], Jordan C. Angle[2], Benjamin D. Jaffe[3], Matthew A. Barnes[1] (1. Texas Tech University, 2. ExxonMobil Upstream Integrated Solutions, 3. ExxonMobil Research Qatar)

P127 - Quantification of environmental DNA (eDNA) shedding by the terrestrial lizard Sceloporus consobrinus using a Macherey-Nagel NucleoSpin DNA extraction method
» Emily Tucker[1], Julianne Bullock[1], Vera Ye[1], Jordan C. Angle[2], Benjamin D. Jaffe[3], Matthew A. Barnes[1] (1. Texas Tech University, 2. ExxonMobil Upstream Integrated Solutions, 3. ExxonMobil Research Qatar)

P128 - Quantifying Microinvertebrate Species in Soil Samples to Determine Their Specific Impact on Soil Health and Plant Abundance
» Sydney Ben[1] (1. Howard Payne University)

5:30pm **Graduate School and Recruitment Fair**
Library Lobby

5:30pm **Reception at Poster Session A**
Library Lobby

Saturday - DETAILED SCHEDULE

Saturday, 2 March

7:30am **Breakfast Reception (by invite) - Past Presidents, Fellows, and BOD**
MB 2104C

8am **Registration**
MB Registrar's Foyer

8:30am **Coffee**
MB Foyer (2nd/3rd/4th floors)

9am **Freshwater Science B & Marine Science**
MB 2260
Chaired by: Mary Johnston and Cynthia Bashara and Madelyn Knauss and Ivy Jones

9am **Algae diversity in ephemeral pools along the upper section of Leon Creek Greenway, San Antonio, Texas**
» Jeff Hutchinson[1] (1. University of Texas at San Antonio)

9:15am **Playa Dynamics and Salinity: A Study of Yellow Lake on the High Plains of Texas**
» John Stout[1] (1. USDA-Agricultural Research Service)

9:30am **Temperature remediation effectiveness of bioretention basins on the University of Texas at San Antonio campus**
» Brian Laub[1], Melissa Garcia[1], Lani May[1] (1. The University of Texas at San Antonio)

9:45am **Assessing the diversity of fishes along the Texas Gulf Coast using environmental DNA metabarcoding**
» Madelyn Knauss[1], Matthew A. Barnes[1], Most Zakia Ferdous Ara Begum[1], Mohamed Fokar[1], Stephanie Lockwood[1] (1. Texas Tech University)

10am **Identification of Biomarkers of Sub-Lethal Algal Toxin Exposure in Atlantic Salmon (Salmo Salar) and Chinook Salmon (Oncorhynchus Tshawytscha) using Differential Gene Expression Analysis**
» Brandon Ellingson[1], Ryan Shartau[1] (1. The University of Texas at Tyler)

10:15am **Using metagenomics to identify comammox pathway in the novel phylum Eisenbacteria**
» Jennifer Hunt[1], Ryan Sibert[2], Jd Carlton[3], Emily Aguilar-Pine[3], KATHRYN CURRIE[3], Brett Baker[3] (1. University of Texas Permian Basin, 2. University of Georgia, 3. University of Texas at Austin)

10:30am **Health Status of Sea Urchin Communities in Roatán, Honduras**
» Ashlyn Kennedy[1], Annie Mowry[2], Racheal Gomez[1], Matthew Hicks[1], Stephanie Lockwood[2], Traesha Robertson[3], Stephanie Randell[1] (1. McLennan Community College, 2. Texas Tech University, 3. College of Coastal Georgia)

Continued from **Saturday, 2 March**

9am **Conservation Ecology + Neurosciences**
MB 2270
Chaired by: Troy Ladine and Wendi Wolfram and Kristi Dietert and Seena Mathew

9am **Collection and analysis of soil environmental DNA for the detection of the Texas kangaroo rat Dipodomys elator**
» Hannah G. Belinne[1], Richard D. Stevens[1], Matthew A. Barnes[1] (1. Texas Tech University)

9:15am **Influence of fluctuating water levels on shorebird use of playas in West Texas**
» Sarah Riney[1], Cade Coldren[1] (1. Texas Tech University)

9:30am **DNA Barcoding of Various Species of Bees in Texas**
» Erin Miller[1], Pritika Thotakura[1] (1. Austin College)

9:45am **High vs. Low-intensity Exercise Training Impact on Drosophila Recovery Following Hypoxia**
» Ashley Faux[1], Seena Mathew[1] (1. University of Mary Hardin-Baylor)

10am **Quantitative Trait Locus Analysis to Identify genes associated with four parameters of locomotive controlled activities in Drosophila simulans, Drosophila sechellia, and their interspecies lines.**
» Caitlyn Stewart[1] (1. University of Houston - Downtown)

9am **Physics & Engineering & Mathematics & Computer Science**
MB 3261
Chaired by: Bryant Wyatt and Matthew Kelly and Angela Brown and Dipak Singh

9am **Robotic Arms Requirement Study to Simulate Human Knee Joint Kinematics on an Elastic Foam**
» Ariful bhuiyan[1], Luong Nguyen[1], Cole Curtis[1], David Sanmiguel[1] (1. University of Houston - Clear lake)

9:15am **Engage a Low-Cost Fatigue Machine To Map Digital Image Correlation Based on Fatigue Strain on a 3D Printed Part**
» Wendy Cardenas[1], Bryan Leon Estrada[1], Ariful bhuiyan[1] (1. University of Houston - Clear lake)

9:30am **The Enderstruder: An accessible open-source syringe extruder compatible with Ender series 3D printers**
» Angel Rodriguez[1], Sabrina Woodward[1], Cody Crosby[1], Domenic Cordova[1] (1. Southwestern University)

9:45am **The Effect of Concentration and Flow Rate of Polycaprolactone Solution on the Tensile Mechanical Properties for Electrospun PCL Fibers at 14 kV**
» Victor Guevara[1], David Cardozo[1], Bryan Leon Estrada[1], Ariful bhuiyan[1] (1. University of Houston - Clear lake)

10am **CSI: Automated Cross-domain Shoeprint Identification Using Deep Learning**
» McKenna Anson[1], Alyssa Oneal[1], Dipak Singh[1] (1. Stephen F. Austin State University)

10:15am **The Deep Learning Approach to UAV Safety**
» George Sikazwe[1], Adam Gower[1], Michael Frye[1] (1. University of the Incarnate Word)

10:30am **Using PyGLPK to Schedule University Course Times**
» Mark Mueller[1], Barbara Anthony[1] (1. Southwestern University)

Saturday - DETAILED SCHEDULE

Continued from **Saturday, 2 March**

9am **STEM Education B**
MB 3269
Chaired by: Lockwood Cox and Felix Greco

9am **The logistics of turning a dream into reality**
» Ralph Zehnder[1] (1. Angelo State University)

9:15am **Examining the Experiences of Women STEM Faculty in West Texas**
» David Sparks[1], Maggie Bullard[1], Maria Arriaga[1] (1. University of Texas Permian Basin)

9:30am **HbA1C, A Biomarker of type2 Diabetes: A Molecular Case Study**
» Bidisha Sengupta[1] (1. Stephen F. Austin State University)

9:45am **Convergence of Chemistry Knowledge and Musical Approach: A new Tool to Improve Students' Learning Outcomes**
» Sajid Bashir (LIU)[1], Catherine Tu[1], John-Ryan Lawrence[1], Jingbo Liu[1] (1. Texas A&M University-Kingsville)

10am **Research Proposal as an Effective Assessment in an Upper-Level Biology Elective Course**
» Joni Ylostalo[1] (1. University of Mary Hardin-Baylor)

10:15am **Conservation Biology and Neuroscience Section Meetings**
MB 2270
Chaired by: Seena Mathew and Troy Ladine and Wendi Wolfram and Kristi Dietert

10:15am **STEM Education Section Meeting**
MB 3269
Chaired by: Felix Greco and Lockwood Cox

10:45am **Marine Science Section Meeting**
MB 2260
Chaired by: Ivy Jones and Madelyn Knauss

10:45am **Physics & Engineering and Mathematics & Computer Science Section Meetings**
MB 3261
Chaired by: Bryant Wyatt and Matthew Kelly and Angela Brown and Dipak Singh

11:15am **TAS Award Presentations**
SCTC 1010

12:45pm **Science Jeopardy!**
SCTC 1010
Chaired by: Evelyn Guerrero and Jennifer Hunt

12:45pm **Lunch**
SCTC 1010 Foyer

Continued from **Saturday, 2 March**

2:30pm **Poster Session B**
Library Event Studio

P2 - Association of Black race and Mortality in Hospitalizations with COVID-19: A Population-Level Study
» Olayide Dipeolu[1], Abraham Akiyode[1], Adeseye Ogundele[1], Aminat Akinfolarin[1], John Garza[2] (1. The University of Texas, Permian Basin, 2. UTPB)

P3 - Substance Use Disorders and Mortality in Traumatic Brain Injuries: A Population Level Analysis
» Abraham Akiyode[1], Olayide Dipeolu[1], Adeseye Ogundele[1], Aminat Akinfolarin[1], John Garza[2] (1. The University of Texas, Permian Basin, 2. UTPB)

P5 - Nicotine Dependence and Mortality in Traumatic Brain Injuries: A Population-Level Analysis
» Aminat Akinfolarin[1], Adeseye Ogundele[1], Abraham Akiyode[1], Olayide Dipeolu[1], John Garza[2] (1. The University of Texas, Permian Basin, 2. UTPB)

P6 - Population Density and Mosquito Trap Success in Harris County Texas: BG-Sentinel Trap vs CDC Light-Trap
» Emeli Carrillo[1] (1. University of Houston - Downtown)

P8 - Gold Nanoparticle Synthesis, Characterization, and Photothermal Activation for Biomedical Application as a Bactericidal Agent
» Travis Bishop[1], Robert Jonas[1], Sumeyra Tek[1] (1. Texas Lutheran University)

P10 - Implications of Insulin and Human Serum Albumin interactions and Insulin oligomerization in Type2 Diabetes: A Virtual Reality perspective
» Nicolas Campos[1] (1. Stephen F. Austin State University)

P13 - Live Cell Imaging of the Actin Cytoskeleton and Fertilization in Nicotine-Induced Polyspermy in Sea Urchins
» Mya Moore[1], Laurel Fohn, MD, PhD[1] (1. Angelo State University)

P15 - Targeting aberrant protein phase separation in human disease
» Cassidy Knox[1], Oliver Kipp[1], Jess Nepogodin[1], Lance English[2], Steven Whitten[1] (1. Department of Chemistry and Biochemistry, Texas State University, 2. Department of Physical Sciences, Temple College)

P17 - Gene expression analysis for comparing Systemic Erythematous Lupus to Drug Induced Lupus using a drug combination of Hydralazine and Valproate to assess for similarities in diagnosing
» Nevaeh Trevino[1], Joni Ylostalo[1] (1. University of Mary Hardin-Baylor)

P23 - The Isolation and Characterization of Bacteriophage, "Woodbury."
» SIERRA MARTINEZ[1], Daiyuan Zhang[1] (1. Del Mar College)

P25 - Induction of M. tuberculosis recA in a rhamnose inducible system
» Luke Brockway[1] (1. Wayland Baptist University)

P29 - The Biochemical Analysis of Avocado (Persea americana) Seeds and their Potential Use in the Treatment of Diabetes
» Stephanie Cruz[1], Arnulfo Mar[1] (1. School of Integrative Biological and Chemical Sciences, University of Texas Rio Grande Valley)

P31 - Mechanistic Investigation of C—C Bond Activation of Phosphaalkynes with Pt(0) Complexes
» Roberto Escobar[1], Abdurrahman Ateşin[1], Tülay Ateşin[2], William Jones[3], Christian Müller[4] (1. School of Integrative Biological and Chemical Sciences, University of Texas Rio Grande Valley, 2. School of Earth, Environmental, and Marine Sciences, University of Texas Rio Grande Valley, 3. Department of Chemistry, University of Rochester, 4. Institute of Chemistry and Biochemistry, Inorganic Chemistry, Freie Universität Berlin)

Saturday - DETAILED SCHEDULE

Continued from **Saturday, 2 March**

2:30pm **Poster Session B**
Library Event Studio

P33 - Synthesis of lanthanide coordination networks as a path to obtain the actinide counterparts.
» Jackson Turner[1], Thomas Hodge[1], Ralph Zehnder[1] (1. Angelo State University)

P35 - The impact of base redundancy on DNA-binding of E. coli RecA.
» Elizabeth Wirth[1] (1. Wayland Baptist University)

P37 - Investigation of Bond Valence Sum (BVS), Local Dipole Moment (LDM), Bond Stability Index (BSI), Global Instability Index (GII), and First-Principle Calculations on Inorganic Molybdate Crystal Structure, A2MoO4 (A = Li, Na, K, Rb, Cs, or Tl)
» Daniel Clifton[1], Zachary Frazier[1], Hong Young Chang[1] (1. Sul Ross State University)

P39 - Chromatographic Analysis of Natural Products
» Mackenzi Williams[1], Michael Nichols[1], Darrell Fry[1] (1. Stephen F. Austin State University)

P41 - Analysis of the energetic and kinetic stability of C24 derivatives doped with row 3 metals: Endohedral (M@C24), exohedral (M-C24), and metallohetero-fullerenes (MC23). M = Sc, V, Mn, Co, Cu, and Ga
» Seok Woo Jang[1], Kyle Beran[1] (1. Angelo State University)

P27 - Protein binding studies for the Cyanide antidote candidate Dimethyl Trisulfide.
» Fernando Esterellas Marquina[1], Nadine Rafeedie[1], Kaylee Black[1], Madison Langley[1], Thomas Villanueva[1], Katherine Vazquez[1], Ricardo Lopez[1], Aashni Khurana[1], Kaia Gray[1], Kari Jordan[1], David Thompson[1], Ilona Petrikovics[1] (1. Sam Houston State University)

P65 - Performance of four Low Impact Development retention basins over the Edwards Aquifer Recharge Zone in San Antonio Texas
» Melissa Ann Garcia[1], Lani May[2], Andrew Pardoe[1], Brian Laub[1] (1. University of Texas at San Antonio, 2. The University of Texas at San Antonio)

P63 - Estimation of metabolic regimes of Harmon Creek from continuously monitored data
» Sandali Siriwardane[1], Amber Ulseth[1] (1. Department of Biology, Sam Houston State University)

P49 - Microbial Community Structure and Organic Matter Quantity Variability in Intermittent and Perennial Reaches of a Semi-Arid, Urban River□Basin
» Mariana Vergara[1], James Stegen[2], Vanessa Garayburu-Caruso[2], Allison Veach[1], Brian Laub[1] (1. University of Texas at San Antonio, 2. Pacific Northwest National Laboratory)

P51 - Detection of invasive virile crayfish (Faxonius virilis) in the Lower Colorado River basin (Arizona) using environmental DNA
» Roger Morin[1], Matthew Troia[1], Jennifer Smith[1], Allison Veach[1] (1. University of Texas at San Antonio)

P53 - Effects of Hunger and Diet on Cannibalistic Tendencies in Freshwater Planarians (Girardia dorotocephala)
» Richard Ridings[1], Chad L. Cryer[1] (1. Temple College)

P55 - Understanding Summer Die-Offs in Southwestern Zebra Mussel Populations: Insights from Elevated Water Temperatures, Metabolic Demands, and Physiological Conditions
» Ava Locklin[1], Pearl Patel[1], Jason Locklin[2] (1. Lake Belton High School, 2. Department of Biology, Temple College)

Continued from **Saturday, 2 March**

2:30pm **Poster Session B**
Library Event Studio

P57 - Assessing the Impact of Elevated Summer Temperatures on the Physiological Condition of Zebra Mussel Populations in Southwestern U.S. Lakes
» Pearl Patel[1], Ava Locklin[1], Jason Locklin[2] (1. Lake Belton High School, 2. Temple College)

P59 - Assessing the risks of a potential zebra mussel (Dreissena polymorpha) invasion in a Taylor County Texas Lake based on water quality during drought periods.
» Maya Morrell[1], Wendi Wolfram[2], Makayla Easley M.S[1] (1. Hardin Simmons University, 2. Purdue University)

P61 - Reassignment of Tryonia diaboli and Texapyrgus longleyi.
» Evan Guerrero[1], Kathryn Perez[1] (1. School of Integrative Biological and Chemical Sciences, University of Texas Rio Grande Valley)

P66 - FRESHWATER TOXINS IN SEASONAL AND YEAR-ROUND ENVIRONMENTS IN TEXAS
» Vivianne Wong[1], Ryan Shartau[1] (1. The University of Texas at Tyler)

P69 - Characterizing and Determining the Appropriate Classification of Meteorite NWA 725
» Krista Collier[1], Elizabeth Koeman-shields[1] (1. Angelo State University)

P68 - The Pediastrum Acme Bio-event. An easy to identify early Coniacian biostratigraphic marker within the Yola Basin, Nigeria
» Benjamin Munoz[1], Dylan Robinson[1], Mohamed K Zobaa[1] (1. UT-Permian Basin)

P67 - Foraminifera and Ostracoda assemblages of the middle Eocene Weches Formation in Nacogdoches County, Texas
» Kandace Muniz[1], Michael Read[1] (1. Stephen F. Austin State University)

P74 - Fighting Crime with AI: Suspect Identification from Shoeprint Impressions
» Alyssa Oneal[1], McKenna Anson[1], Dipak Singh[1] (1. Stephen F. Austin State University)

P75 - Developing Machine Learning Models to Predict Oral Cancer
» Adhira Tippur[1], Marzieh Ayati[2] (1. Mathematics and Science Academy at the University of Texas Rio Grande Valley, 2. Department of Computer Science, University of Texas Rio Grande Valley)

P73 - Utilizing Yolo v.8 Computer Vision Machine Learning Algorithm for Recognition and Measurement of Zebra Mussel Specimens in a Laboratory Setting
» Benjamin Nau[1], Jason Locklin[2] (1. Department of Biology, Temple College, 2. Temple College)

P86 - A Molecular Dynamics Study: The Study of Cut-off Distance between Two Different Atoms for Different Lennard-Jones Potential
» Marco Perez[1], Ariful bhuiyan[2], Serkan Caliskan[2], Nabila Shamim[3] (1. University of Houston Clear lake, 2. University of Houston - Clear lake, 3. Praire View A&M University)

P85 - Robotic Arm Study to Simulate Human Knee Joint Kinematics on an Elastic Material
» Ariful bhuiyan[1], Luong Nguyen[1], David Sanmiguel[1], Cole Curtis[1] (1. University of Houston - Clear lake)

P83 - The Effect of Voltage Between the Syringe Needle and the Collector on the Tensile Testing Mechanical Properties for Electrospun Polycaprolactone Fibers
» David Cardozo[1], Victor Guevara[2], Bryan Leon Estrada[1], Ariful bhuiyan[1] (1. University of Houston - Clear lake, 2. University of Houston Clear lake)

Saturday - DETAILED SCHEDULE

Continued from **Saturday, 2 March**

2:30pm **Poster Session B**
Library Event Studio

P84 - Digital Image Correlation Based Fatigue Strain Mapping Study on a 3D Printed Part with a Low-Cost Fatigue Machine
» Bryan Leon Estrada[1], Wendy Cardenas[2], Ariful bhuiyan[1] (1. University of Houston - Clear lake, 2. University of Houston Clear lake)

P87 - Autonomous Parallel Parking Using Reinforcement Learning
» Jesus Cavazos[1] (1. University of the Incarnate Word)

P96 - Exploring the Antibacterial Potential of Native Ephedra Species in the Permian Basin
» Jaqueline Barrera[1], Analiza Rayos[2], Irene Perry[1] (1. The University of Texas, Permian Basin, 2. University of Texas Permian Basin)

P94 - Comparative analysis of the effect of nutrients in Lolium multiflorum
» Ali Ahmed[1], Kattia Palacio-Lopez[1] (1. University of Houston - Downtown)

P88 - DNA Barcoding used to Identify Panicum spp. Collected in Guadalupe County, Texas.
» Sage Bartlett[1], Mark Gustafson[1], Alan Lievens[1], Danielle Grove[1], Stephanie Perez[1] (1. Texas Lutheran University)

P90 - Gene flow among populations of the annual wildflower Mentzelia pectinata (Loasaceae).
» Jessica Edo[1], Yourim Cho[1], Joshua Brokaw[1] (1. Abilene Christian University)

P92 - Haplotype diversity among populations representing separate varieties of Mentzelia pectinata (Loasaceae).
» Sanskruti Gandhi[1], Ashley Moran[1], Joshua Brokaw[1] (1. Abilene Christian University)

P102 - A Walk Through Geologic Time: Creating Interest in Earth Sciences using an Archival Website for the SFA Rock Garden
» Rebecca Beyer[1], Mindy Faulkner[1] (1. Stephen F. Austin State University)

P100 - Social Vulnerability Index & Mosquito Prevalence in Harris County Texas: Aedes aegypti vs Aedes albopictus
» Betram Nguyen[1] (1. University of Houston - Downtown)

P99 - Developing micro-credentialing criteria for High Performance Liquid Chromatography
» Jace Gidley[1], Darrell Fry[1] (1. Stephen F. Austin State University)

P98 - EcoJEDI Summer Research Program Experiences at Our Lady of the Lake University (OLLU) 2023
» Aaliyah Delgado[1], Torrence Campos[1], Julianna Collins[1], Jamie Crosswhite[1], Briana Salas[1] (1. Our Lady of the Lake University)

P111 - Columella Morphology in Mississippi Kites (Ictinia Mississippiensis)
» Adina Hernandez[1], Ben Skipper[1] (1. Angelo State University)

P101 - Uncovering overlapping mechanisms between different locomotion behaviors in two Drosophila species
» Juan Magadan[1], Esperanza Sanchez[1], Caitlyn Stewart[1], Yuanyuan Kang[2] (1. University of Houston - Downtown, 2. University of Houston-Downtown)

P110 - Interspecific diversity within the genus Thomasomys (Rodentia: Cricetidae) in Ecuador.
» Yourim Cho[1], Jessica Edo[1], Joshua Brokaw[1], Thomas Lee[1] (1. Abilene Christian University)

Continued from **Saturday, 2 March**

2:30pm **Poster Session B**
Library Event Studio

P109 - Phylogenetic relationships of the high-hat cavesnail Phreatodrobia punctata (Mollusca: Gastropoda)
» Michelle Flores[1], Kathryn Perez[2] (1. The University of Texas Rio Grande Valley, 2. School of Integrative Biological and Chemical Sciences, University of Texas Rio Grande Valley)

P108 - Taxonomic Analysis of springsnails of Pyrgulopsis located in Nevada
» Trenton Meadows[1], Kathryn Perez[2] (1. University of Texas Rio Grande Valley, 2. School of Integrative Biological and Chemical Sciences, University of Texas Rio Grande Valley)

P107 - Phreatodrobia coronae (Mollusca: Gastropoda) is the imposter of the genus
» Yamileth Guerrero[1], Kathryn Perez[1] (1. School of Integrative Biological and Chemical Sciences, University of Texas Rio Grande Valley)

P106 - Investigating morphologically disparate populations of the domed cavesnail
» Lisa Gonzalez[1], Kathryn Perez[2] (1. University of Texas Rio Grande Valley, 2. School of Integrative Biological and Chemical Sciences, University of Texas Rio Grande Valley)

P103 - Thriving Under Pressure: A Comparative Study of Bacillus subtilis Strains in Varying Salt and Temperature Conditions
» Eduarda Stein Christ[1], Robert Jonas[1] (1. Texas Lutheran University)

P104 - Assessment of symbiosis between Phyllanthus (Phyllanthaceae) and Epicephala (Lepidoptera: Gracillariidae) in the Caribbean
» Chelsea Rodriguez[1], Elvia Meléndez-Ackerman[2], David Hembry[1] (1. University of Texas Permian Basin, 2. University of Puerto Rico, Río Piedras)

P105 - Molecular phylogenetic analysis of the Beaked Cavesnail (Phreatodrobia rotunda) & understanding possible convergent evolution of shell shape
» Vanessa Saenz[1], Kathryn Perez[1] (1. School of Integrative Biological and Chemical Sciences, University of Texas Rio Grande Valley)

P129 - Unraveling a Decade of Mosquito Species Localization in Harris County
» Arbaz Khan[1], Alexi Soto[1], Zara Usman[1], Standlee Courtney[1] (1. University of Houston - Downtown)

P112 - Microbiome variation across the mutualism-parasitism transition in leafflower moths Lepidoptera: Gracillariidae: Epicephala
» Sarai Badillo[1], Athenia Oldham[1], David Hembry[1] (1. University of Texas Permian Basin)

P124 - Superworms are Indeed Super! An Initial Examination of a Beetle's Dietary Use of Polystyrene
» Tara P. Hansler[1], Richard Wilson Patrock[2] (1. 1515 Caribbean Dr. Corpus Christi, TX 78418, 2. Department of Biological and Health Sciences, Texas A&M University-Kingsville (TAMUK))

P121 - Ultraviolet reflectance of lichens incorporated into ruby-throated hummingbird nests
» Andrew A. Hart[1], Chad L. Cryer[2], Jeff R. Troy[1], Tom Andrews[3] (1. Department of Biology, Temple College, 2. Temple College, 3. Baylor University)

P119 - Shifting activity of raccoons (Procyon lotor) in an urban system in response to COVID
» Zoey Conner[1], Troy Ladine[1] (1. East Texas Baptist Universtity)

Saturday/Sunday - DETAILED SCHEDULE

Continued from **Saturday, 2 March**

2:30pm **Poster Session B**
Library Event Studio

P117 - Diurnal Roost Sites and Forest Structure and Composition used by Porcupines in the Upper Leon Creek Greenway, San Antonio, Texas.
» Kate Kampman[1], Angel Velasquez[1], Jeff Hutchinson[1] (1. University of Texas at San Antonio)

P115 - Seasonal patterns of allochthonous sources of energy into ephemeral pools in Leon Creek Greenway, San Antonio, Texas.
» ANGEL VELASQUEZ[1], Jeff Hutchinson[1] (1. University of Texas at San Antonio)

P126 - Quantification of environmental DNA (eDNA) shedding by the terrestrial lizard Sceloporus consobrinus using a QIAGEN Power Soil DNA extraction method
» Vera Ye[1], Julianne Bullock[1], Emily Tucker[1], Jordan C. Angle[2], Benjamin D. Jaffe[3], Matthew A. Barnes[1] (1. Texas Tech University, 2. ExxonMobil Upstream Integrated Solutions, 3. ExxonMobil Research Qatar)

2:30pm **Graduate School and Recruiting Fair (at Poster Session)**
Library Lobby

2:30pm **Reception at Poster Session B**
Library Lobby

4pm **Grad Student Competition**
SCTC 1010

4pm **Synthesis and Evaluation of Carbamate Bioconjugates for Hepatocyte Transplantation**
» Johann Karunananthan[1], Bob Kane[1], Elena McGown[1] (1. Baylor University)

4:20pm **The effects of invasive feral hog on channel conditions and benthic macroinvertebrate communities in the South Llano River**
» Hayden Hays[1], Scott Longing[1], Matthew A. Barnes[1] (1. Texas Tech University)

4:40pm **Effects of Transcranial Infrared Laser Stimulation on Prefrontal Functional Connectivity and Impulse Control in Adults with Attention-Deficit/Hyperactivity Disorder**
» Farzad Salehpour[1], Anagh Mirji[1], Sarah Diaz[2], Nisarg Shah[1], Vikas Burugu[1], Douglas Barrett[2], F. Gonzalez-Lima[2] (1. Department of Psychology and Institute for Neuroscience, University of Texas at Austin, USA, 2. The University of Texas at Austin)

5pm **Investigation of residual mineral content of bauxite piles: Saline Mining District, Arkansas**
» Melanie Ertons[1], Mindy Faulkner[1] (1. Stephen F. Austin State University)

5:30pm **Section Chairs Meeting**
SCTC 1102

7pm **Awards Banquet**
MCM Grande FunDome Hotel

Sunday, 3 March

8am **Field Trip 2: Ecology of an Urban Playa Lake**
Meet in Science & Technology Building main parking lot

POSTER ABSTRACTS

(by poster number)

P1 - AN EXTENDED STANDARD OF PROCESSING PROCEDURES PREPARES UNDERGRADUATE VOLUNTEERS AND ATTEMPTS TO INCREASE OVERALL EFFICIENCY

AUTHORS

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ABSTRACT

The Forensic Anthropology Center at Texas State (FACTS) operates a Willed Body Donation Program and manages the Texas State Donated Skeletal Collection (TXSTDSC). Prior to their curation into the TXSTDSC, donors undergo processing at the Osteological Research and Processing Lab (ORPL). At ORPL, processing relies on the efforts of qualified undergraduate volunteers, interns, and graduate students. The rate of donor curation varies, occasionally leading to a backlog of skeletons awaiting processing. The lack of returning undergraduate volunteers at ORPL contributes to delays in donor curation because new volunteers do not have the experience to process as efficiently as returning volunteers. To address these problems, we developed an informational guide specifically for new undergraduate volunteers. This guide extends the existing FACTS Standard Operating Procedures (SOPs) by incorporating insights from current undergraduate volunteers and the ORPL's doctoral assistant. While the FACTS SOPs are provided to volunteers during initial training, our extended guide offers additional detail on specific techniques required in their tasks. This document also serves as a reference to address questions that may arise during their work. By enhancing the information given to new undergraduate volunteers during onboarding and before practical training, the guide aims to improve efficiency in skeleton processing and lead to measurable reductions in backlogs at FACTS. Furthermore, this project's framework can be adapted by other processing labs, offering insights into ORPL techniques, training strategies for undergraduate volunteers, and methods to enhance efficiency in the processing of willed donor bodies by human skeletal laboratories.

P2 - ASSOCIATION OF BLACK RACE AND MORTALITY IN HOSPITALIZATIONS WITH COVID-19: A POPULATION-LEVEL STUDY

AUTHORS

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ABSTRACT

Existing research on the association of race and mortality in COVID-19 hospitalizations is inconclusive. In this project, we conducted a population-level analysis of Black race and mortality in hospitalized patients with COVID-19. We used publicly available, statewide, and deidentified hospitalization records of patients aged ≥18 years with a diagnosis of COVID-19 admitted to acute care hospitals in Texas from Q2 2020 through Q1 2022. Patients with COVID-19 were identified using International Classification of Diseases, Tenth Revision, Clinical Modification code U071. Three models estimated the association between Black and in-hospital mortality. Multilevel logistic regression with propensity adjustment was the primary analysis approach with propensity score matching and multivariable logistic regression without propensity score matching applied as alternative analyses. Additional analyses were completed for subgroups, sensitivity, and for the secondary outcome of short-term mortality. Our results show that of 480,670 hospitalizations with COVID-19, 64,732 (13.5%) were Black. Blacks were younger (35.2% vs 44.3% aged ≥ 65 years), more often female (55.7% vs 48.6%), and had higher mean[SD] Deyo comorbidity index(1.61[1.92] vs 1.26[1.76]); $p < 0.0001$ for each. Hospital mortality for Blacks and non-Blacks was 9.6% vs 13.1%. On adjusted analyses, Black race remained associated with lower in-hospital mortality (adjusted odds ratio 0.7171 [95% CI 0.6903 - 0.7450]). Results were similar for alternative modeling approaches, subgroup analyses, sensitivity analyses, and the secondary outcome of short-term mortality. In conclusion, Black race was associated with lower mortality for patients with a diagnosis of COVID-19. Studies exploring the mechanisms leading to these findings are needed.

P3 - SUBSTANCE USE DISORDERS AND MORTALITY IN TRAUMATIC BRAIN INJURIES: A POPULATION LEVEL ANALYSIS

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ABSTRACT

Existing research on the association of substance use disorders (SUD) and mortality following traumatic brain injury (TBI) is limited. In this project, we conducted a population-level analysis of SUD and TBI. We used publicly available, statewide, and de-identified hospitalization records of patients aged ≥18 years with a principal diagnosis of initial encounter for TBI admitted to acute care hospitals in Texas from 2016 through 2022. TBI hospitalizations were identified using Clinical Classification Software Refined, Category INJ008, Traumatic brain injury (TBI); concussion, initial encounter. Three models estimated the association between SUD and in-hospital mortality. Multilevel logistic regression with propensity adjustment was the primary analysis approach with propensity score matching and multivariable logistic regression applied as alternative analyses. Additional analyses were completed for subgroups, sensitivity, and for the secondary outcome of short-term mortality. Our research showed that of 90,405 TBI hospitalizations, 7,649 (8.5%) had SUD. TBI hospitalizations with vs without a SUD had higher rates of mental disorders (26.0% vs 17.1%); $p < 0.0001$ for each. Unadjusted in-hospital mortality for TBI patients with and without a SUD was 6.2% vs 9.0%. On adjusted analyses, SUD remained associated with lower odds of short-term mortality (adjusted odds ratio 0.5767 [95% CI 0.5111–0.6506]). The results were similar for the alternative modeling approaches, subgroup analyses, and the secondary outcome of short-term mortality. In conclusion, SUD were unexpectedly associated with lower risk of both in-hospital and short-term mortality for TBI hospitalizations. Studies exploring the mechanisms leading to these findings will improve understanding of mortality following TBI.

P4 - RELATIVE IMPORTANCE OF RISK FACTORS IN COVID-19 HOSPITAL MORTALITY

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ABSTRACT

Existing research has identified many risk factors for in-hospital mortality of patients diagnosed with COVID-19. However, the relative importance of risk factors has not been computed at the population level. In this project, we conducted a population-level analysis of the relative importance of risk factors for in-hospital mortality of patients with a diagnosis of COVID-19. We used publicly available, statewide, and deidentified hospitalization records of patients aged ≥18 years with a diagnosis of COVID-19 admitted to acute care hospitals in Texas from Q2 2020 through Q1 2022. Patients with COVID-19 were identified using International Classification of Diseases, Tenth Revision, Clinical Modification code U071. Age, race/ethnicity, sex, type of health insurance, obesity, smoking, malnutrition, mental disorders, alcohol use disorders, substance use disorders, and the Deyo modification of Charlson comorbidities were derived as covariates. Covariates were used as risk adjustment variables in a multivariable logistic regression model with in-hospital mortality as response variable. The fitted logistic regression model was then used to complete relative importance analysis using the extension of relative weights analysis for logistic regression detailed in recent publications. Our results show that of 480,679 hospitalizations with COVID-19, 60,584 (12.6%) expired in hospital. Age was the most important risk-factor (49.7% relative importance), followed by myocardial infarction (7.5%), sex (6.5%), malnutrition (6.3%), and type of insurance, (5.7%). In conclusion, the results of variable importance analysis are a valuable supplement to population level mortality models and can inform resource allocation decisions intended to reduce in-hospital mortality amongst patients with a diagnosis of COVID-19.

P5 - NICOTINE DEPENDENCE AND MORTALITY IN TRAUMATIC BRAIN INJURIES: A POPULATION-LEVEL ANALYSIS

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ABSTRACT

Nicotine dependence in traumatic brain injuries (TBI) is associated with diminished recovery. However, the impact of nicotine dependence on mortality following TBI has not been determined. In this project, we conducted a population-level analysis of nicotine dependence and mortality in hospitalizations with a principal diagnosis for TBI. We used publicly available, statewide, and deidentified hospitalization records of patients aged ≥18 years with a principal diagnosis of initial encounter for TBI admitted to acute care hospitals in Texas from 2016 through 2022. TBI hospitalizations were identified using Clinical Classification Software Refined, Category INJ008, Traumatic brain injury (TBI); concussion, initial encounter. Three models estimated the association between nicotine dependence and in-hospital mortality. Multilevel logistic regression with propensity adjustment was the primary analysis approach with propensity score matching and multivariable logistic

regression applied as alternative analyses. Additional analyses were completed for subgroups, sensitivity, and for the secondary outcome of short-term mortality. Our research showed that of 90,405 TBI hospitalizations, 21,990 (24.3%) had nicotine dependence. Unadjusted in-hospital mortality for TBI patients with and without a nicotine dependence was 5.1% vs 10.0%. On adjusted analyses, nicotine dependence remained associated with lower odds of mortality (adjusted odds ratio 0.7331 [95% CI 0.0.6670–0.8056]). The results were similar for the alternative modeling approaches, subgroup analyses, and the secondary outcome of short-term mortality. In conclusion, nicotine dependence was unexpectedly associated with substantially lower risk of both in-hospital and short-term mortality for TBI hospitalizations. Studies exploring the mechanisms leading to these findings will improve understanding of mortality following TBI.

P6 - POPULATION DENSITY AND MOSQUITO TRAP SUCCESS IN HARRIS COUNTY TEXAS: BG-SENTINEL TRAP VS CDC LIGHT-TRAP

AUTHORS

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ABSTRACT

The transmission of many diseases are commonly seen through a single mosquito bite. Harris County Texas is the perfect habitat for these mosquitoes. With a warm humid climate and frequent precipitation, mosquitoes thrive here. To monitor mosquitoes and the transmission of diseases, Harris county utilizes the BG-Sentinel Trap, CDC-Light Trap, and the Gravid Trap. The **BG-Sentinel (BG)** and the **CDC-Light trap (CDC)** both use CO2 to attract mosquitoes. The BG-Sentinel trap contains BG-Lure that mimics human scent using a combination of substances found on human skin. **If there is an increase in population density in a city, then the acquisition of mosquitoes in the BG-Sentinel trap will be more prevalent than the CDC-light trap as a result of the usage of BG-Lure.** Data from eight different cities was retrieved from the Harris County Department of Public Health and analyzed over a five-year period.The results portrayed a higher species richness and diversity in the BG trap than the CDC trap throughout all eight cities that were studied. Regardless of the size of each city, the BG trap showed the greatest performance of mosquito capture and is to be the most prevalent in the acquisition of mosquitoes. The usage of mosquito traps are necessary to help monitor outbreaks in the community and decrease the transmission of mosquito borne diseases.

P7 - THE PHARMACEUTICAL COMPOUNDS OF YUCCA FILAMENTOSA

AUTHORS

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ABSTRACT

Yucca Filamentosa (Common Yucca) is an edible and medicinal plant that is native to Mexico. The extracts of yucca are known to have anti-inflammatory and anti-arthritic effects due to the plant having a high source of steroidal saponins. Saponins are glycosidic compounds that have biological effects including lowering blood glucose response and decreasing blood lipids. Yucca extracts also have anti-fungal and anti-bacterial properties used to treat infections and lower cholesterol levels. Yucca extracts in studies are shown to fight against multiple microorganisms like E. coli, Staphylococcus aureus, and Candida albincans. The compounds from yucca extracts can be removed through a water-based extraction. Water-based extractions involved using water as the purifier for the natural material, like plants and animal tissue. The water is then heated to pass through the cell wall and dissolve desired compounds. Yucca compounds can also be extracted through ethanol-based extraction following the same basic procedures. The compounds that both the water and ethanol-based extractions will get are steroidal saponins that are fat-soluble. Water and ethanol yucca extracts will be tested for antimicrobial and antifungal properties.

P8 - GOLD NANOPARTICLE SYNTHESIS, CHARACTERIZATION, AND PHOTOTHERMAL ACTIVATION FOR BIOMEDICAL APPLICATION AS A BACTERICIDAL AGENT

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ABSTRACT

Gold nanoparticles are a novel biomedical agent indicated for their use in targeted therapy against cancer cells and various pathogenic bacteria. They have recently seen a large increase in interest given the rising prevalence of antibiotic resistance. Most worthy of noting is the ability of the particles to deliver selectively activatable antibacterial effects to targeted cells through a plethora of simultaneous mechanisms, leaving little to no room for the development of resistance. On the nano scale, these individual particles obtain unique optical properties that allow for localized photothermal excitation and subsequent activation of said mechanisms. In the present study, gold nanoparticles were synthesized and characterized for

use in antimicrobial work with the goal of demonstrating their antibacterial effects and potential for implementation as a reactivatable sterilizing surface for surgical tools. Escherichia coli and Staphylococcus epidermidis were inoculated with gold nanoparticles and irradiated under a 532 nm laser and measured for zones of inhibition. Little effect on the bacterial colonies was observed. However, promising results of antibacterial effects were noted when gold nanoparticles were inoculated alongside a Pseudomonas species found in contaminated water and irradiated. The relative diffuse concentration of bacteria within the water, as compared to the utilized culture broths, is thought to have contributed to bacterial death upon photothermal activation. Further research is required to more precisely delineate the correlation between bacterial concentrations and the effective antimicrobial actions of gold nanoparticles.

P9 - EVALUATING THE EFFICACY OF PINE OIL AND LEMON OIL AS BIOSAFE ALTERNATIVES TO XYLENE IN HISTOLOGICAL STAINING

AUTHORS

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ABSTRACT

Xylene is an aromatic hydrocarbon used as a histoprocessing agent for biological tissues as a part of several histological staining protocols, including Hematoxylin and Eosin (H&E) and Masson's Trichrome. Xylene is the standard agent used to dewax and clear tissues in the deparaffinization and dehydration steps in standard H&E and Masson's Trichrome protocols. Xylene is a biohazard and an environmental pollutant classified as hazardous waste that can cause skin, eye, and respiratory irritation, drowsiness, or dizziness and may cause damage to organs through prolonged or repeated exposure. In this study, we tested pine oil and lemon oil as economical alternatives to xylene as a deparaffinizing and clearing agent to reduce environmental impact and minimize the risks to human health associated with exposure to xylene. The control and two experimental groups were processed using murine mammary gland tissue. We used xylene as the control in both deparaffinization and dehydration steps. In the experimental groups, we substituted xylene with pine oil or lemon oil in deparaffinization steps, dehydration steps, or both. All slides were blinded and evaluated based on nuclear staining, cytoplasmic staining, clarity, color balance, and uniformity. Our results indicate that pine oil and lemon oil performed comparably to xylene in all categories. Our next steps include optimizing H&E and Masson's Trichrome staining protocols with pine oil and lemon oil, testing other tissue types like kidney and lung, and evaluating the longevity of the staining on the slides.

P10 - IMPLICATIONS OF INSULIN AND HUMAN SERUM ALBUMIN INTERACTIONS AND INSULIN OLIGOMERIZATION IN TYPE2 DIABETES: A VIRTUAL REALITY PERSPECTIVE

AUTHORS

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ABSTRACT

Diabetes is a severe chronic disease that can be characterized by symptoms of unexpected weight loss, numbness of hands and feet, or extreme fatigue. According to the CDC, 9% (or 29.7 million) Americans were diagnosed with diabetes in 2021, which can be fatal without treatment. The causation for this disease is linked to an individual's insulin, which is a hormone that stimulates the formation of glycogen (a homo-polysaccharide that can be stored in the skeletal muscles). Insulin aggregation or deficiency can prevent glucose from entering the cell to be metabolized. It causes glucose deposition in the blood leading to dangerously high glucose levels in the red blood cells, and allows the formation of glycated hemoglobin (HbA1C). Prolonged HbA1C creates advanced glycation end products (AGEs) and oxidative stress, which can cause insulin oligomerization. The present study aims to understand the molecular interactions between human serum albumin (HSA, the natural carrier of drugs in body) and insulin as well as between insulin - insulin, in order to analyze the similarities and differences in their binding interactions. After performing the molecular docking between HSA (receptor) and insulin (ligand) using Cluspro and Pymol, we observed 13 polar and several noncovalent interactions. The polar bonds were found between (glu442,Leu13), (glu442_tyr143), (glu442_asn9), (asp471_gly23), (asp471_arg22), (val473_tyr16), (asp89_lys29), (lys106_ser9), (gln104_ser9), (gln104_cys7), (glu100_his5), (glu100_gln4), (asp340_tyr14) (HSA, Insulin). On the other hand, insulin only had 4 polar contacts with another insulin, which includes (gln21, tyr26), (glu13, lys15), (tyr16, glu13), and (tyr26, lys29). Further studies are being performed.

P11 - BIOINFORMATIC ANALYSIS OF SHORT-CHAIN FATTY ACID RECEPTORS AND TRANSPORTERS: IMPLICATIONS FOR PRIMARY OPEN-ANGLE GLAUCOMA

AUTHORS

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ABSTRACT

Short chain fatty acids (SCFAs) include acetate, butyrate and propionate are produced as by-products of the fermentation of dietary fiber by commensal bacteria in the colon. SCFAs primarily function as signaling molecules in maintaining homeostasis in the gut and energy sources for the colon. Recent studies have suggested that an imbalance of the gut microbiota (termed dysbiosis) may have critical effects in the development of systemic diseases, ranging from diabetes, cancer, and neurodegeneration. Recently, we have proven the existence of a gut-eye axis that when dysbiosis sets on, numerous ocular complications follow such as dry-eye and primary open-angle glaucoma (POAG). Purpose: In this study, we focused on understanding the genomic sequences of various species of solute carrier family 5 member 8 (SLC5a8) a monocarboxylate transporter and butyrate receptors as compared to humans. Methods: Genome sequences for butyrate receptors FFAR2, FFAR3, GPR109a and SLC5a8 transporter from human were compared to different closely related species to determine how conserved they were to human. Phylogenetic trees were built using MAGAX, sequence homology studies performed using M-Coffee, and protein structure prediction models built using ExPASy to determine areas of conservation. Results: Our studies demonstrate that butyrate receptors and transporters are very conserved between human and mice, more specifically, those mice strains which have been shown to develop ocular hypertension. These results provide further evidence for the involvement of SCFA receptors and transporters in POAG.

P12 - EVALUATION OF HEAVY METALS IN SELECTED BRANDS OF BABY FOODS IN THE UNITED STATES.

AUTHORS

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ABSTRACT

Heavy metals are natural components of our ecosystem although anthropogenic sources have significantly led to long-term environmental pollution of the food chain system. Daily diet remains a major route of excessive metal intake, hence, the need for safe limits. Some heavy metals are metabolically essential, while some are toxic at low concentrations resulting in adverse health risks. Young children are extremely vulnerable due to their immature organ, immune systems and metal bio-accumulation and poor detoxification in living cells. This study evaluated heavy metal contaminations in ten selected food products for infants and toddlers purchased from a local store, with ingredients ranging between diary, fruit, beef, chicken, root vegetable, or grains in triplicates using QQQ-ICP-MS to detect the presence of arsenic, cadmium, zinc, lead, nickel, aluminum, and chromium. Baby foods formulated from fruits and root tubers exhibited the highest concentrations of all tested heavy metals although no food label reported this. Using the ASTDR guidelines for safe limits, aluminum (2.50 µg/g to 4.09 µg/g) and zinc (30.2 µg/g to 69.5 µg/g, and) exceeded the recommended levels of 1 µg/g/day and 2-3 µg/g /day respectively. Mixed model analysis found significant differences in metal concentrations ($F_{6,24}$=2.75, p=0.03) with no significant correlations between the packaging materials used and the observed metal concentrations (p >0.05, Std error 1.98). Our results concluded that the presence of heavy metals is linked to food type. Pathways increasing soil to food chain contaminations should be continuously monitored so as to achieve the newly established FDA's closer to zero Act.

P13 - LIVE CELL IMAGING OF THE ACTIN CYTOSKELETON AND FERTILIZATION IN NICOTINE-INDUCED POLYSPERMY IN SEA URCHINS

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ABSTRACT

Polyspermy is typically a lethal phenomenon in which numerous sperm penetrate an egg. To prevent polyspermy, sea urchins form a fertilization envelope, a physical blockade that forms when a single sperm penetrates the egg that blocks excess penetration of sperm. Cytoskeletal elements, such as actin, play critical roles in fertilization envelope development. Eggs exposed to nicotine, however, exhibit polyspermy in a dose-dependent manner and are found to have abnormal actin organization, consequently altering the formation of the fertilization envelope. Our goal is to establish a protocol for live cell imaging and visualization of nicotine-induced polyspermy using readily available reagents and technology at Angelo State University. Our study will consist of spawning sea urchins to collect gametes, administering the spawned eggs a permeable fluorescent dye that specifically binds to actin filaments, incubating the eggs in a nicotine solution, and then observing cytoskeletal changes during fertilization using fluorescent microscopy. To further our understanding of the effects of nicotine, we want to do an additional experiment in which we prestain the sperm pronuclei, prior to the protocol previously described,

and observe changes in pronuclei fusion in relation to cytoskeletal changes. Preliminary results show that Hoechst fluorescent dye was successful in staining egg and sperm pronuclei and that fertilization can easily be observed. We anticipate that our project will provide insight into evolutionary adaptations that prevent polyspermy in animals. In terms of clinical applications, our study could function as a stepping stone in understanding the relationship between nicotine consumption and spontaneous abortions in humans.

P14 – WITHDRAWN

AUTHORS

ABSTRACT

P15 - TARGETING ABERRANT PROTEIN PHASE SEPARATION IN HUMAN DISEASE

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ABSTRACT

Protein-mediated macromolecular phase separation is thought to be a primary driving force for the formation of membrane-less organelles, which control a wide range of biological functions from stress response to ribosome biogenesis. Among phase-separating (PS) proteins, many have intrinsically disordered regions (IDRs) that are needed for phase separation to occur. Accurate identification of IDRs that drive phase separation is thus important for testing the underlying mechanisms of phase separation, identifying processes that rely on phase separation, and designing sequences that modulate phase separation. To this end, we created the ParSe algorithm that identifies PS IDRs from the primary sequence based on the robust property differences between folded, ID, and PS ID protein regions. We used this algorithm to analyze the human proteome and found that proteins known to be associated with human disease are strongly enriched in phase separation potential. We have developed a method to measure this potential experimentally and test the idea that disease variants correlate with aberrant phase-separating properties. This will enable mechanistic studies to better understand physiological protein-mediated macromolecular phase separation, how it is used by the cell, and its relationships to human health.

P16 - EXPLORING THE EFFECTS OF ARTIFICIAL SWEETENER ON STEM CELLS

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ABSTRACT

Modern diets have changed significantly through the popularization of low-calorie substitutes such as artificial sweeteners. Many of the long-term effects of these sweeteners are unknown. We aim to explore the effects of artificial sweeteners on stem cells using planaria as a model organism. Each group will be fed a different type of artificial sweetener including stevia, monk fruit, aspartame, and dextrose for a month before being bisected. The average growth rate of each group will serve as an indicator of stem cell activity. Gene expression related to stem cell proliferation will be quantified by semi-quantitative RT-polymerase chain reaction (PCR) using the SuperScript IV One-Step System and the Qiagen OneStep Ahead RT-PCR kit. This method will test four specific aims. The first is the effect of different sweeteners on Dugesia physiology. The second is the morphometric analysis of planaria regeneration following exposure to sugar and different artificial sweeteners. The second is optimizing RT-PCR analysis for genes expressed in neoblasts by comparing the performance of two different RT-PCR kits. The third aim will be accomplished through using the optimized method to compare the regenerative gene expression between the control and experimental groups. Data so far suggest that aspartame and stevia are detrimental to planaria growth and regeneration. This information would be useful for understanding the effects of artificial sweeteners in the diet on normal, regenerative tissue and therapies that use induced pluripotent stem cells, such as bone marrow transplants or hematopoietic transplants.

P17 - GENE EXPRESSION ANALYSIS FOR COMPARING SYSTEMIC ERYTHEMATOUS LUPUS TO DRUG INDUCED LUPUS USING A DRUG COMBINATION OF HYDRALAZINE AND VALPROATE TO ASSESS FOR SIMILARITIES IN DIAGNOSING

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ABSTRACT

Systemic erythematous lupus is the most common form of lupus, almost 70% of all lupus cases are systemic erythematous lupus. Whereas, drug Induced lupus is the lowest form, getting around only 10 % of cases. However, drug induced lupus has

enough symptom similarities to systemic erythematous lupus creating another challenge in diagnosing lupus. This research utilizes bioinformatics for gene analysis expression for determining the similarities of the two lupus infestations using peripheral blood mononuclear cell samples from homosapiens for the systemic erythematous (SLE) study and taking HuT78 and Raji cells also from homosapiens that have been treated with hydrazine-valproate drug combination for the drug induced study (DIL). This study results in high downregulated genes for both studies, having a total of 284 for systemic and 734 total for the drug combination study. Principal component analysis or PCA, was a tool used to showcase an overview of the two high valued data sets. The PCA mapping percentages did have similar proximities, DIL has a low of 3% and high of 83.3%. SLE PCA had a low of 5.8% and a high of 75.7%. Systemic lupus does still hold higher genetic impacts overall than drug induced, but still close proximity effects for misdiagnosing the types.

P18 - MEASURING THE EFFECTIVENESS OF DIFFERENT PRODUCE CLEANSERS ON ORGANICALLY GROWN VERSUS CONVENTIONALLY GROWN PRODUCE

AUTHORS

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ABSTRACT

Fresh produce is purchased on a daily basis from stores but what many do not know is that these food items are common transporter of many disease-causing pathogens. Currently, there are a multitude of options when considering how to best clean the produce, but it is unconfirmed which method is the most effective. This study focuses on determining the effectiveness of store-bought cleansers, homemade cleansers, and rinsing with water to remove microbes from organically grown versus conventionally grown produce items. To test the cleansers, two groups of strawberries, apples, lettuce, and carrots will be obtained, one organic group and one regular group, and swabbed for microbes. A variety of specialized agar plates will be used to determine the characteristics of the microbes to classify any pathogens present. The produce will be swabbed after each round of cleansing with a different agent and the microbes will be cultured to determine how well they were reduced following the cleansing. Results will be analyzed to determine which cleansing method was most effective at reducing microbe and pathogen numbers, and if the organic or conventional produce provided a cleaner food item following the cleansing. Additionally, microbes will be gram-stained to further discover what pathogens were most commonly present and if one was more targeted by the cleansers than another. It is hypothesized that a store-bought cleanser containing harsher chemicals, paired with an organic produce item, will be the most effective at providing a clean produce item.

P19 - EFFECTS OF DEIONIZED WATER VS SPRING WATER ON FLATWORM POPULATIONS IN LABORATORY SETTINGS

AUTHORS

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ABSTRACT

Daniel Baptiste, Chad Cryer

Free-living flatworms (Girardia dorotocephala) have been used as a model organism for studying regeneration in a laboratory setting. However, keeping them alive for extended periods of time can be challenging. We tested the hypothesis that deionized water would cause the flatworms to die as it would represent a hypotonic solution for the flatworms. However, we show that freshly ordered flatworms can survive in deionized water and spring water for weeks. Six jars housing flatworms were filled with deionized or store-bought spring water and monitored over eight days. Daily checks were made to document the flatworms' health and mark any deaths. Our results indicate no significant difference in death rate between the two groups, confirming our null hypothesis that water type had no significant impact on flatworm death rate in lab-grown populations. Our results demonstrate the safety of deionized water and alkaline environments when housing flatworms. Our research seeks to provide a better understanding of successful flatworm husbandry and potential issues to consider.

P20 - AN APPLICATION OF ALTERNATIVE METHODS FOR TOXICITY ASSESSMENT OF E-LIQUID BINARY MIXTURES

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ABSTRACT

Vaping includes the use of electronic cigarettes (or e-cig) for heating of solutions into inhalable aerosols. E-liquids are mixture solutions consisting of ingredients like an active ingredient, diluent, and flavoring agents. In 2019, increased hospitalizations of patients resulted in the CDC defining a public health crisis known as EVALI. As a result, investigations into the potential

toxicity associated with vaping products have increased. We aim to investigate and utilize two alternative exposure methods for assessment of e-liquid toxicity on lung in vitro models. The first method tested two unheated e-liquid ingredients on two lung cell models. After exposure, cytotoxicity and chemical interactions were assessed. Cytotoxicity was measured using LC_{50} dose response curves of both single constituent and binary mixture solutions. The 80:20 %v/v mixture (diluent: flavoring agent) resulted in higher toxicity than the 97:3 %v/v mixture. Isobolographic analysis was used to assess chemical interactions of binary mixtures. Each mixture resulted in an antagonistic interaction. The second method utilized a low cost condensate collection system to collect a condensate sample after vaping of a binary e-liquid mixture. Chemical analysis of the condensate sample for byproduct identification was conducted using nuclear magnetic resonance (NMR) spectroscopy. Diluted condensate samples were tested for toxicity on a a lung cell model. Toxicity was assessed by measuring viability via the MTS assay and oxidative stress via the ROS-Glo H_2O_2 assay which measures hydrogen peroxide levels. In condensate treated cells, decreased viability and increased hydrogen peroxide levels resulted as compared to a control of cells in media.

P21 - HOW VARIATION IN PLANARIA (GIRARDIA DOROTOCEPHALA) DIET AFFECTS REGENERATION GROWTH

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ABSTRACT

Planarian regeneration studies and observations have spanned over 100 years in the past. Since then, it has been found that planarians can shrink or grow depending on their food availability and quality of food. The abundant amount of neoblasts found in their molecular biology enables this ability for regeneration, but little is done to measure how their diet may interact with this growth. In this project, we see that an abundance of protein as well as freshness play an important role in the overall health and speed of regeneration in planaria. Through our testing, we found that the planaria's eyes regenerated far faster when provided with fresh/high protein foods such as beef liver and egg yolk as opposed to less nutrient-rich substances like kale or aged beef liver. This showed us that planarian diet does not just rely on protein-rich foods but also on how long that food stays fresh. This demonstrates how important diet is when considering regenerative experiments since planaria are known to be able to regenerate from even the tiniest incisions. This study can be taken to provide an easier baseline and understanding for those who are planning on measuring regeneration for planaria and other organisms. Having this knowledge will allow others to be able to identify if their results have been influenced or skewed due to mistakes in handling diet as well as which foods are best for getting the fastest regenerative results.

P22 - A HIGH-CHOLESTEROL DIET IN DROSOPHILA MELANOGASTER IMPACTS THE RATE AT WHICH THE CEPHALIC FURROW UNDERGOES MORPHOGENESIS

AUTHORS

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ABSTRACT

The cephalic furrow (CF) forms deep grooves along the lateral sides of Drosophila melanogaster and takes up over one-third of an embryo's length. Cephalic furrow formation (CFF) is vital for embryonic morphogenesis, involving intricate cellular changes, membrane dynamics, and pressure differentials that establish a baseline tension across the apical surface, suggesting a role in coordinating other morphogenetic movements through mechanical stress feedback mechanisms. The gene ImpE1 has been found to accelerate CFF. The LDLR receptor domain region of ImpE1 is thought to bind cholesterol and regulate cholesterol homeostasis. However, the precise impact of cholesterol upregulation on the CF has not yet been tested. To test the impact of cholesterol on ImpE1 and CF development, I plan to feed separate groups of wild-type Drosophila a homemade media of cornmeal, agar, molasses, and baker's yeast with varying levels of cholesterol. I will then time CFF using fluorescence microscopy. Studies thus far have focused on the feasibility of using CellMask™ Plasma Membrane stain and Hoechst fluorescent nuclear stain to visualize the CF and surrounding structures. Results to date show that these fluorescent dyes do not readily cross the egg chorion. So, another method using bleach was utilized to remove the chorion. Results demonstrated that a small percentage of embryos survived this method, were properly stained, and their development was visible. With the methods established, we can compare the CF formation of positive control embryos to embryos fed varying cholesterol diets.

P23 - THE ISOLATION AND CHARACTERIZATION OF BACTERIOPHAGE, "WOODBURY."

AUTHORS

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ABSTRACT

Bacteriophages are a group of viruses that target bacteria and it is believed that there is are over 10^{31} bacteriophage on the planet. More than every other organism on Earth combined. Widely abundant and available for isolation, they have been used

for many different pharmaceutical/medical applications, such as gene therapy and treatment of infections resistant to antibiotics. In order to discover and classify a novel bacteriophage, a variety of procedures were performed that were intended to isolate the phage and then further isolate and harvest the genomic DNA. We began with a soil collection, then an enrichment procedure on our bacterial host, Mycobacterium smegmatis. After performing a titer assay to confirm presence of phage, we chose 3 plaques to perform a spot test on. After the spot test, we further isolated our phage by performing a streak test. The streak test was repeated 3 times from an isolated phage from the previous plate to ensure the isolation of a single phage from the soil. The phage DNA then underwent restriction digest analysis, sequencing, and TEM imaging. The presence of lysogen was confirmed by a spot test and a lysogenic assay was also performed to quantify the lytic activity of the phage. Bacteriophage "Woodbury" was confirmed to be lytic but had no confirmed recognition sites for 3/5 enzymes tested, callng into question its viability in being used for things such as gene therapy. "Woodbury" is published on phages.db.

P24 - ANALYZING THE GENE EXPRESSION OF PRE AND POST CHEMOTHERAPY TREATED METASTATIC TRIPLE NEGATIVE BREAST CANCER SAMPLES

AUTHORS

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ABSTRACT

Triple negative breast cancer (TNBC) is characterized by its speedy aggression and ability to progress faster than other forms of cancer. TNBC has a higher rate of
recurrence that may metastasize all over the human body. It is the most lethal cancer due to its resistance towards many treatments, including new regenerative techniques that incorporate stem cells. The absence of receptors for Her2+, progesterone, and estrogen allow triple negative breast cancer to become even more aggressive. BRCA (BReast CAncer gene) 1 and 2, are tumor suppressor genes that participate in processes such as DNA repair, recombination, apoptosis, cell cycle checkpoint control, and transcriptional regulation. Mutations that occur within the two genes can lead to defective DNA repair mechanisms, increasing the susceptibility to cancer development. Chemotherapy, a common treatment for cancers, has been used to slow down cell proliferation. However, slowing the growth of these malignant cells fails to treat the underlying cause. Bioinformatics approaches were used in this research to study gene expression in the pre and post chemotherapy breast cancer samples and to analyze changes in BRCA1 and 2 levels, identifying distinct patterns. The levels of P53 gene expression were studied to help in the understanding of the changes of BRCA1 and 2. Results showed that BRCA1 was overexpressed in TNBC and surpassed the expression of BRCA2. The further goal of this research is to analyze the impact of chemotherapy on BRCA1 and 2 in TNBC patients.

P25 - INDUCTION OF M. TUBERCULOSIS RECA IN A RHAMNOSE INDUCIBLE SYSTEM

AUTHORS

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ABSTRACT

Tuberculosis continues to be a major cause of death worldwide because Mycobacterium tuberculosis bacteria (MTB) can develop antibiotic resistance making antibiotic treatment inconsistent and expensive. Our preliminary findings suggest that MTB recA protein plays a role in the ability to develop antibiotic resistance; therefore, understanding how recA functions during DNA repair could lead to more effective treatments. MTB recombinant protein must be produced with high efficiency to conduct future experiments. Modified mature and full-length forms of the pET-21 MTB plasmid were transformed into E. coli JM109 Competent Cells for plasmid amplification and DNA purification through a midiprep strategy. With the harvested and validated plasmid forms, KRX Competent Cells were transformed with MTB plasmids and two control plasmids: Beta-Catenin and T7 Luciferase. A time course induction was then designed to confirm incremental recA protein production through SDS-PAGE before continuing to the end goal of purified MTB recA protein.

P26 - SYNTHESIS OF DIMETHYLMALONIC ACID USING POTASSIUM PERMANGANATE UNDER ALKALINE CONDITIONS

AUTHORS

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ABSTRACT

Dimethylmalonic acid was synthesized using neopentyl glycol as substrate. The substrate's primary alcohols were oxidized using potassium permanganate under alkaline conditions. Special attention is needed during work-up to maximize yield. Specifically, it was found necessary to cover the aqueous solution of dipotassium dimethylmalonate with ethyl acetate during acidification. After extraction with ethyl acetate, solvent evaporation must be performed at room temperature and atmospheric pressure. The aqueous layer is dried at room temperature and atmospheric pressure; product extraction from the solids using ethyl acetate provided additional yield. The synthesis and purification used resulted in a 67.728% yield with 99.2% purity. The decomposition temperature of dimethylmalonic acid is 136.5 °C. The pKa of dimethylmalonic acid is 4.36.

P27 - PROTEIN BINDING STUDIES FOR THE CYANIDE ANTIDOTE CANDIDATE DIMETHYL TRISULFIDE.

AUTHORS

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ABSTRACT

Cyanide (CN) is known for its toxic nature and deathly effects on the human body as it inhibits ATP Production. Treating the victim quickly is critical to increase chances of survival, which can be difficult with current antidotes, Nithiodote™ and Cyanokit®. A novel Sulfur Donor type antidote, Dimethyl Trisulfide (DMTS), has been developed to serve as a fast-acting and easy to administer intramuscular antidote for Cyanide poisoning. We have been working on a series of in vitro tests further characterizing DMTS. Our focus was on DMTS' protein binding affinity. In our study we used a 10% formulated DMTS by Southwest Research Institute (SWRI) San Antonio, Texas. This is critical information about the drug since binding affinity directly affects bioavailability. Our studies involved the use of Protein Equilibrium Dialysis (PED) method to test the protein binding affinity as well as the Parallel Artificial Membrane Permeability Assay (PAMPA) method for membrane binding and penetration. HPLC was used to measure the concentrations in the donor and acceptor cells in the PED and the PAMPA systems with and without Albumin.The PAMPA and PED studies revealed that Albumin decreased the membrane penetration of DMTS by 19% and 20% respectively. Both methods suggest that DMTS has significant binding affinity to Albumin, potentially decreasing its bioavailability in vivo.

P28 - DEVELOPMENT OF THE HK97 VLP AS A VERSATILE PLATFORM FOR TARGETED DRUG DELIVERY

AUTHORS

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ABSTRACT

The development of targeted drug delivery vehicles holds promise to lower the amount of drug required for therapeutic efficacy and adverse drug reactions by delivering drugs with high specificity to desired tissues with minimal non-target site delivery. Virus-like particles (VLPs) offer a versatile platform suitable for targeted drug delivery and their development as platforms and drug carriers holds promise for constructing advanced drug delivery biomaterials. VLPs are self-assembling protein cage structures derived from viral coat proteins, but are non-infectious, and contain hollow interior spaces suitable for loading various molecular cargoes, including drugs. VLPs can be modified both on their interior and exterior surfaces through site-specific mutagenesis, to add or alter amino acid sequences, enabling the chemical programming of the VLP structure for encapsulation of molecules and direction of VLPs to cellular/tissue targets. Presented here is the investigation of the HK97 VLP, derived from the bacteriophage HK97, that has been modified internally with fluorescent molecules that enable cellular tracking of the VLPs, with adaptable external modifications that direct the VLPs to cellular targets. Here we present preliminary data for the construction, characterization, and cellular delivery of HK97 VLPs programmed for muscle cell targeting toward tissue specific therapeutic delivery to muscle cells and combating cancer cachexia.

P29 - THE BIOCHEMICAL ANALYSIS OF AVOCADO (PERSEA AMERICANA) SEEDS AND THEIR POTENTIAL USE IN THE TREATMENT OF DIABETES

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ABSTRACT

Avocado (Persea americana) is a widely consumed fruit known for its nutritional and health benefits. While various previous studies have focused mainly on the biochemical composition of avocado pulp, limited research has been conducted on the biochemical analysis of the avocado seed. This study aimed to investigate the bioactive compounds present in avocado seeds and their potential health benefits. The biochemical analysis of avocado seeds was performed using various techniques, including but not limited to Biuret's assay, thin-layer chromatography and spectrophotometric assays. The results revealed that avocado seeds contain a diverse range of bioactive compounds such as ascorbic acid, proteins, and sugars. This study highlights the importance of avocados' seed biochemical analysis for understanding its potential health benefits. The bioactive compounds identified in avocado seeds demonstrate anti-oxidative properties which have been proven to exhibit health benefits. Our future plans include research to explore the therapeutic applications of these bioactive compounds from avocado seeds for human health promotion and disease prevention.

P30 - INVESTIGATIONS OF IN VITRO DISASSEMBLY AND REASSEMBLY OF THE HK97 VIRUS-LIKE PARTICLE FOR ENCAPSULATION OF FOREIGN GUEST MOLECULES

AUTHORS

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ABSTRACT

Protein cage structures are ubiquitous in nature and present useful nanomaterials for applications ranging from drug delivery to the construction of nanoelectronics. Among protein cages, virus-like particles (VLPs), which are derived from the protein shell or capsid of viruses but lack pathogenic components, are particularly intriguing for constructing nanomaterials due to their stability, well studied molecular assembly and structures, which are often characterized to the molecular level. The research presented here looks at investigating the in vitro disassembly and reassembly of the VLP derived from the HK97 bacteriophage. The HK97 VLP platform holds promise for applications such as drug and gene delivery and in vitro reassembly has the potential to expand the types of guest molecules and macromolecules that can be trapped on the interior. Investigations look at using a green fluorescent protein (GFP) as a model guest molecule and include molecular characterization of the reassembled VLPs to determine the viability of incorporating foreign guest molecules into the HK97 VLP without altering structural integrity.

P31 - MECHANISTIC INVESTIGATION OF C—C BOND ACTIVATION OF PHOSPHAALKYNES WITH PT(0) COMPLEXES

AUTHORS

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ABSTRACT

Carbon–carbon (C–C) bond activation has gained increased attention as a direct method for the synthesis of pharmaceuticals. Due to the thermodynamic stability and kinetic inaccessibility of the C–C bonds, however, activation of C–C bonds by homogeneous transition-metal catalysts under mild homogeneous conditions is still a challenge. Most of the systems in which the activation occurs either have aromatization or relief of ring strain as the primary driving force. The activation of unstrained C–C bonds of phosphaalkynes does not have this advantage. This study employs Density Functional Theory (DFT) calculations to elucidate Pt(0)-mediated C–CP bond activation mechanisms in phosphaalkynes. Investigating the thermal reductive elimination pathway from the C–CP bond activation product, we present energetics of resulting metal complexes, potential reaction intermediates, and reaction pathways leading to product formation in polar solvent (tetrahydrofuran). Additionally, comparisons between mesityl and phenyl groups, Pt(0) and Ni(0), and ligand-substituent variations reveal nuanced influences on product stability and transition state energies. Parallels with C–CN bond activation in benzonitriles with the Ni(0) fragment provide additional context, advancing understanding not only of C–C bond activation but also offering insights into broader transition-metal-catalyzed reactions. This study, encapsulating the intricacies of C–C bond activation in phosphaalkynes and its implications, contributes to the evolving landscape of pharmaceutical synthesis and catalysis. For example, the application of Pt(0)-mediated C–CP bond activation in the pharmaceutical industry offers innovative routes for drug synthesis, potentially leading to production of novel therapeutic agents with enhanced biological activities.

P32 - LANTHANIDE COORDINATION POLYMERS WITH VARIOUS TEREPHTHALATE DERIVATIVES

AUTHORS

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ABSTRACT

Combining neodymium (Nd) with the terephthalate (TP) ligand and glutarate (Glut) entity using slow diffusion methods at room temperature yields an Nd-coordination polymer of formula $Nd_2(Glut)_2(TP)(H_2O)_4 \bullet 17H_2O$ with spacious interstitial channels. This coordination network can easily be modified via incorporation of various terephthalate derivatives exhibiting functional groups, such as aminoterephthalate ($TPNH_2$), hydroxyterephthalate (TPOH), etc. These terephthalate derivatives replace the regular TP entities, without altering the structural properties of this coordination network whatsoever ($Nd_2(Glut)_2(TPX)(H_2O)_4 \bullet 17H_2O$, with X = NH_2, OH, NO_2, Br).
Herein we showcase the creation of new lanthanide coordination polymers, in which two different terephthalate derivatives (TPX) were incorporated into a network without utilizing the glutarate ligand.

P33 - SYNTHESIS OF LANTHANIDE COORDINATION NETWORKS AS A PATH TO OBTAIN THE ACTINIDE COUNTERPARTS.

AUTHORS

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ABSTRACT

Lanthanides are often used as surrogates for actinides in f-element chemistry due to similar chemical properties and ionic radii. As a result, experiments involving lanthanides can be easily adapted for the study of radioactive transuranic actinides that would otherwise be difficult to work with. We are currently increasing the number of lanthanide coordination polymers in our collection to apply similar protocols for the creation of their trivalent transuranium counterparts, when provided with the opportunity. Our experimental methods include slow diffusion approaches at room temperature as well as hydrothermal synthetic methods.

P34 - DESIGN AND SYNTHESIS OF DOUBLE-ESIPT FLUORESCENT PROBES FOR MULTI-ANALYTES DETECTION

AUTHORS

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ABSTRACT

Abstract:
A urea-bis(7-DEA-coumarin-enamine) molecular probe has been synthesized that shows multi-analyte detection via optical spectroscopy i.e., UV-vis and fluorescence spectroscopy. Incorporating enamine-moiety to hydroxycoumarin allows to form a non-covalent interaction lead the formation of new six membered ring system through Resonance Assisted Hydrogen Bonding (RAHB) that extends conjugation. Photophysical properties have been studied in different solvent systems (DMSO, CH3CN, DMF, MeOH, EtOH, Me2CO, MeCO2Et, CHCl3, C6H5Me, and C6H6). DMSO was chosen as optimum solvent as it stabilized the probes through twisted intermolecular charge transfer (TICT) of diethylamino group present in the molecule, DMSO solution produced a pale greenish color with two broad absorptions band at 388nm and 475nm and emission at 550nm. Upon the addition of the anions (CH3COO-, F-, CN-, PO43-, Cl-, Br-, I-, NO3-, SCN-), certain anions perturbed the new ring system (RAHB) as it formed via a weak non-covalent interaction (hydrogen bonding) that leads to change of optical response. However, only CH3COO-, F-, CN-, PO43- shows optical response in both UV-vis and fluorescence. Cyanide ions produced distinct absorption and emission band than other anions due to Michael-addition to enamine moiety whereas CH3COO-, F-, PO43- undergoes ESIPT mechanism.

P35 - THE IMPACT OF BASE REDUNDANCY ON DNA-BINDING OF E. COLI RECA.

AUTHORS

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ABSTRACT

E. coli RecA has displayed sequence specificity during DNA binding experiments performed with sequences from the Mycobacterium tuberculosis genome. The placement of purines and pyridines within these sequences was analyzed and compared to the observed relative binding strength of RecA. These patterns revealed that sequences with relatively strong binding exhibited a higher frequency of base repeats of four or more. Oligonucleotides were then designed with varying C and

T base content to analyze the impact of base redundancy on RecA binding. EMSAs were performed in which non-biotinylated sequences were titrated in with signal-producing biotinylated sequences to establish IC-50 values for the synthetic sequences.

P36 - THERMAL AND STRUCTURAL ANALYSIS ON STRANDBERG-TYPE POLYOXOMETALATES (POMS)

AUTHORS

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ABSTRACT

Polyoxometalate (POM) has varying compositions and structures. Through their shapes and sizes, POMs have been found many applications in the areas of catalysis, medicine, and material science. Of the diverse POMs, this research focuses on Strandberg-type POM. It consists of a ring from six MoO_6 octahedral and two caped SeO_3 above and below the ring. Interestingly, Strandberg-type POMs show chiral properties attributed to the asymmetrical local dipole moments by a bunch of distorted d^0 transition metal cations (Mo^{6+}) and lone-pair cations (Se^{4+}). Thus, we investigate the thermal and structural properties of the Strandberg-type polyoxometalates (POMs), $AMo_5Se_2O_{21}$ (A = K, Rb, or Cs) through their crystal packing structures, local dipole moments from the polyhedral of Mo^{6+} and Se^{4+} cations, the extent of strains and distortions inner unit cells.

P37 - INVESTIGATION OF BOND VALENCE SUM (BVS), LOCAL DIPOLE MOMENT (LDM), BOND STABILITY INDEX (BSI), GLOBAL INSTABILITY INDEX (GII), AND FIRST-PRINCIPLE CALCULATIONS ON INORGANIC MOLYBDATE CRYSTAL STRUCTURE, A2MOO4 (A = LI, NA, K, RB, CS, OR TL)

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ABSTRACT

The inorganic molybdate crystal structure, A2MoO4 (A = Li, Na, K, Rb, Cs, or Tl), was reported. Interestingly, Li2MoO4 (space group: P32 (#145), cell parameters: a = b = 14.362(3) Å, c = 9.604(1) Å, α = β = 90° g = 120°, V = 1715.59 Å3, Z = 18) and Tl2MoO4 (space group: C2 (#5), cell parameters: a = 10.565(3) Å, b = 6.4178(13) Å, c = 8.039(2) Å, α = 90°, β = 91.05(4)°, g = 90°, V = 544.99 Å3, Z = 4) show non-centrosymmetric structures while the other iso-structures including Na+, K+, Rb+, and Cs+ cations have centrosymmetric structures, respectively. Thus, for the application of the reported inorganic molybdate systems as nonlinear optic (NLO) materials, we will analyze their structural properties through bond valence sum (BVS), the local dipole moment (LDM) for the polyhedral of alkali metal cations and Mo6+ cation in the structures, the bond stability index (BSI), and the global instability index (GII). In addition, we will calculate their optical properties by First-Principle method and density functional theory (DFT).

P38 - ADVENTURES IN IN DEVELOPING A RADIATIONLESS STRAND EXCHANGE PROTOCOL: A TWEEN DRAMA

AUTHORS

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ABSTRACT

Our lab is developing a RecA strand exchange protocol independent of radiolabeling, instead using post-strand exchange phosphate-directed biotinylation followed by chemiluminescent detection. Early efforts saw a loss of about 90% signal, indicating that a reagent was likely interfering with biotinylation in the final step. Biotinylation efficiency was evaluated in the presence of all individual components that are introduced throughout the protocol. It was determined that the manufacturer supplied apyrase buffer inhibited our Biotinylation. A substitute MES buffer that differed from the manufacturer's buffer only in that it contained no tween was prepared in our lab at pH 6.5 and 7.2. Biotinylation was restored when the ATP-removal step was carried out in the homemade tween-free buffer at pH 6.5. This demonstrates sufficient signal maintenance to deploy this protocol in detection of RecA strand exchange products.

P39 - CHROMATOGRAPHIC ANALYSIS OF NATURAL PRODUCTS

AUTHORS

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ABSTRACT

Both Gas Chromatograph (GC) and High-Performance Liquid Chromatography (HPLC) are ideal chromatograph techniques to separate complex mixtures. Recently, Stephen F. Austin State University (SFASU) began a collaboration with local farmer who is growing castor plants (Ricinus communis) and harvesting the oil from the castor beans. The castor oil has economic value based depending upon the mixture of triglycerides which make up the oil. Using GC, the castor oil from the local farmer was analyzed. The chromatographic results will be presented. Eupatorium serotium, also known as Late Boneset, is native to East Texas. The Eupatorium genus has several plants which have been shown to have anti-inflammatory properties—it has been hypothesized that sesquiterpene lactones are responsible for the anti-inflammatory properties. Using HPLC we carried out a series of preliminary separation procedures designed serve as a launching point for finding and identifying sesquiterpene lactones in Late Boneset harvested in East Texas.

P40 - A METHODICAL EVALUATION OF AIDAN FRUIT'S ANTIDIABETIC PROPERTIES

AUTHORS

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ABSTRACT

Studies have proven that the Aidan plant, Tetrapleura tetraptera, has a use in modern medicine for aiding in digestion. This aid has also proved in organisms such as Type 2 Diabetic rats, that it has anti-diabetic properties that allow for the anti-resistance of insulin for a more equalized metabolism and blood sugar. A chemical process to find antioxidants and phytochemicals that contain antidiabetic and digestion properties will be done. Diabetes plays a huge role in today's modern society, having almost 30 million individuals in the United States suffer from it. With this information, finding the molecules inside the Aidan plant may give a helping hand in treating individuals suffering with Type 2 Diabetes. This will be done by observing the contents of the fatty acids in the Aidan plant, and observing the molecules contained inside of the ash after the Aidan plant is broken down close enough to its organic makeup.

P41 - ANALYSIS OF THE ENERGETIC AND KINETIC STABILITY OF C24 DERIVATIVES DOPED WITH ROW 3 METALS: ENDOHEDRAL (M@C24), EXOHEDRAL (M-C24), AND METALLOHETERO-FULLERENES (MC23). M = SC, V, MN, CO, CU, AND GA

AUTHORS

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ABSTRACT

Density-functional theory was applied to the investigation of the structural, energetic, and electronic properties of C_{24} fullerene derivatives. Row 3 metals (M = Sc, V, Mn, Co, Cu, and Ga), in various oxidation and spin-states, are incorporated into the C_{24} cage system as an endohedral, exohedral, and metallohetero-fullerene derivatives. Optimized geometries and corresponding energetics are analyzed and compared to the bare C_{24} cage for the purposes of the evaluation of relative stabilities. Without exception the neutrally charged form of the derivatives are the most energetically stable relative to their corresponding charged species. The optimized exohedral M-C_{24} geometries yield M-C bond lengths that are consistent with comparable metal-carbon bond lengths. All of the endohedral M@C_{24} derivatives energetically prefer the low-spin state and the equilibrium structures maintain the integrity of the cage structure with an only moderate increase in the volume of the cage. Apart from cobalt, the metallohetero MC_{23} complexes energetically prefer that the metal is substituted in place of a carbon atom at a hexagon position of the C_{24} structure. Collectively, 72% of the derivatives are predicted to be kinetically more stable than the unadorned C_{24} fullerene, 100% of the absolute reaction energies for the formation of the exohedral and metallohetero derivatives are predicted to result in more energetically stable than the M and C_{24} or C_{23} reactants, and 50% of the endohedral derivatives are predicted to be more energetically stable than the metal and C_{24} reactants.

P42 - EFFECT OF ANTHROPOGENIC NOISE ON SELECTED MAMMALS IN AN URBAN SYSTEM

AUTHORS

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ABSTRACT

An investigation of the effect of anthropogenic noise (fireworks) on the activity of selected mammals was conducted from Oct. 2014 to Nov. 2023 using motion-sensor-trail-camera data. The study site is located entirely in the city limits of Marshall, TX on the Environmental Studies Area of East Texas Baptist University. Selected mammals included common raccoon (Procyon lotor), gray fox (Urocyon cinereoargenteus), Virginia opossum (Didelphis virginiana), and white-tailed deer (Odocoileus virginianus). Activity of the selected species during seasonal firework displays (31 Dec. – 1 Jan. and 3 – 5 July) was compared to random dates selected throughout the study using a Poisson probability. Our data indicate a negative effect of fireworks on

the mean activity, during days which fireworks are lit, of raccoons (P(7.4) = 0.0181) and activity of white-tailed deer (P(2.8) = 0.0463). Virginia opossums (P(1.6) = 0.406) and gray fox (P(1.8) = 0.558) did not appear to be affected by the noise of fireworks. Fireworks have the potential to alter behavior of selected species of mammals and should be used with discretion to avoid negative responses.

P43 - COMMUNITY COMPOSITION OF A MESIC EDWARDS PLATEAU CLIFF ON FLAT ROCK CREEK IN BOSQUE COUNTY, TEXAS

AUTHORS

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ABSTRACT

A rare cliff community comprised of layers of limestone and sandstone occurs on the Blackwell Ranch in Bosque County, Texas. Bosque County occurs in the Cross Timbers and Prairies ecoregion and the Cliff community is currently only known as part of the Edwards Plateau of Texas. The community has tentatively been identified as a Mesic Edwards Plateau Cliff (MEPC), which is rare in Texas. It occurs along Flat Rock Creek, a stream that traverses the ranch and is 180 meters above sea level. The MEPC includes lush vegetation, including the chatterbox orchid (Epipactus gigantea), the Lady Tresses Orchid (Spiranthes cernua), the maidenhair fern (Adiantum capillus-veneris), the maiden fern (Thelypteris ovata), and the Cliff-Break fern (Pellaea atropurpurea). These communities are little known, but they appear to have similarities with other cliff communities, such as Western hanging gardens and moist igneous, limestone, sandstone, and chert cliffs. These are typically small communities of ferns, mosses, and other, often rare plants that grow from shallow bedrock soil near a spring or a seep. Diatoms are also frequently found in these rare cliff communities on the walls of the cliffs as well as the seep or spring associated with the community. We are currently examining the algal and plant species composition of the MEPC since little is known about the ecosystem.

P44 - TRENDS IN RAPTOR ADMISSIONS TO WILDLIFE REHABILITATION CENTERS ACROSS 13 YEARS IN THE SOUTHERN HIGHT PLAINS OF TEXAS

AUTHORS

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ABSTRACT

As urbanization increases, human and wildlife interaction and conflicts are becoming more frequent. Wildlife rehabilitation centers have become important resources for a public that has become increasingly concerned for the well fare of injured wildlife. However, details on admission rates and outcomes are often lacking. We examined 13 years of admission data for birds of prey submitted to the South Plains Wildlife Rehabilitation Center and Night Wings Rehabilitation Center, both located in Lubbock Texas. The raptors submitted were categorized by reason for admission: 1) collision, 2) illness, and 3) other. Submissions were also categorized by age: 1) independent (adults and juveniles after their first winter), 2) juveniles in their first winter, and 3) dependent juveniles (e.g., nestlings and fledglings). Owls however were categorized only as independent and or dependent juveniles. We recorded 3,231 individuals of 28 raptor species (2 Cathartiformes, 15 Accipitriformes, 4 Falconiformes, and 7 Strigiformes) admitted during the study period at an average of 248.6 admissions per year. Seven species each accounted for ≥ 5% of admissions. Adult and older juveniles accounted for 53%, first winter juveniles accounting for 14.4%, and nestling and fledglings accounting for 32.5% of admissions. Collisions accounted for 50% of admissions, various illnesses accounted for 10%, and rescue/kidnapping of nestlings accounted for 26% of admissions. Among collisions injuries, the most common presentation was broken wings (51%). Our data indicate raptors are a commonly admitted taxonomic group, possibly due to their easy recognition and appreciation by members of the public.

P45 - PESTALOTIOPSIS MICROSPORA IN MICROGRAVITY

AUTHORS

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ABSTRACT

The goal of this investigation is to determine whether the fungus Pestalotiopsis microspora can survive and reproduce in the unique conditions of a microgravity environment. Plastic can take anywhere from 250 years to well over 1000 years to decompose, but even after this decomposition, the micro plastics left behind are hazardous to the environment. P.

microspora is a fungus capable of breaking down plastic and converting it to easy biodegradable compounds, similar to compost. If the P. microspora can grow in a microgravity environment, such as space, and is still able to break down plastics, then its recycling capabilities could be a viable alternative to simply shooting waste back at the earth (the current standard for waste disposal from the ISS). This method would help solve the issue of how to properly reduce or eliminate the waste that astronauts produce in space. In addition, the P. microspora could create a usable byproduct that astronauts could use to grow useful plants in, as the P. microspora turns the plastic into organic material that is highly conducive to plant growth. These two very desirable qualities of P. microspora make it a prime candidate to study in microgravity.

P46 - ABUNDANCE AND DIVERSITY OF ANURANS BETWEEN TWO ANTHROPOGENIC WETLAND HABITATS ON SUL ROSS PROPERTY.

AUTHORS

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ABSTRACT

Global amphibian biodiversity has steadily declined for decades, primarily resulting from anthropogenic changes via habitat loss and alteration, contaminated waterways, and climate change. Anthropogenic land modifications have been linked to amphibian biodiversity decline and contribute to variances in abundance and species diversity. While negative human impacts are often highlighted, some species see population increases from more available breeding habitats or abundant prey items. Desert-dwelling species rely on ephemeral pools and wetlands for mating, breeding, and tadpole metamorphosis. The study looked at variations in anuran diversity and abundance between two different anthropogenically modified habitats associated with water. The study sites are located in Alpine, Texas and include vernal, man-made agricultural stock ponds and land depressions resulting from a dried springhead. Along with examining water quality and depth, perimeter transects will be used for visual and auditory surveying of species richness, abundance, and distribution. I hypothesized that there will be differences in the diversity and abundance of anurans between the two anthropogenically modified wetlands habitats, due to the differences between topography and hydroperiod of each ephemeral site. While I expected to see differences in utilization periods in species, the field season met with unexpected drought conditions. The occupancy of the species after the rain at the sites demonstrated that species will come out to feed and call at known ephemeral pond sites but without ample collection of water, breeding does not appear to occur.

P47 - EFFECT OF SHRUB REMOVAL ON PRAIRIE PLANT DIVERSITY

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ABSTRACT

Brush invasion has become more prominent in grasslands where the native woody plants have increased in coverage. The removal of woody plants can help restore prairies by reducing competition and increasing herbaceous plant diversity. This study took place at the Weston Ranch in northern Guadalupe County in Texas. The project focused on the restoration of prairie land that was invaded by huisache (Vachellia farnesiana) and mesquite shrubs (Prosopis glandulosa). In 2019, four plots (1000 m2 each) were established for measurement of prairie vegetation. Woody plants were removed mechanically from two of the plots in the summer of 2020; the other two plots were not modified. The research used the Modified-Whittaker Plot Design to measure biodiversity and percentage cover of plants. The four plots were then observed at regular intervals over the span of five years. There was no consistent trend in plant diversity over the five years, possibly due to variation in rainfall from year to year. There were differences in percent coverage between cleared and uncleared plots for certain native plant species. Some species such as Helianthus annuus and Croton monanthogynus had an increase in numbers in the cleared plots. Firewheel (Gaillardia pulchella) was the most abundant species found in all four plots for the summer of 2023.

P48 - DETECTION AND MONITORING OF CYANOBACTERIA TOXINS IN TEXAS WATERBODIES

AUTHORS

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ABSTRACT

Harmful algal blooms (HABs) occur across Texas and cause many adverse effects for humans and animals. Currently, there is little information on the types and distribution of HABs that occur in small freshwater systems in Texas. Due to their toxicity, HABs induce problems for animal health, often resulting in animal mortality, and economic losses for landowners as the waterbodies become unusable. An important step towards the mitigation of negative impacts from HABs is to identify the toxins present, where they occur, possible driving factors of toxin production, and water chemistry associated with toxins. Using well established methods, year-round and seasonal waterbodies are surveyed for the presence of algal toxins that pose

threats to humans, wildlife, and agriculture. These waterbodies include sites at Holly Lake Ranch (HLR), and The University of Texas at Tyler. This study investigates water quality at these sites in East Texas and how water sources influence the presence and concentration of algal toxins. Result from this work demonstrate cyanobacterial toxins are common to waterbodies in East Texas with large variation between sites in the type of toxin and concentration. Not surprisingly, sites downstream of a commercial dairy farm exhibited increased toxin levels. This project is part of a longer monitoring effort to understand the presence and distribution of algal toxins in Texas and will inform on future projects examining the physiological impact of toxins identified on aquatic organisms.

P49 - MICROBIAL COMMUNITY STRUCTURE AND ORGANIC MATTER QUANTITY VARIABILITY IN INTERMITTENT AND PERENNIAL REACHES OF A SEMI-ARID, URBAN RIVER BASIN

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ABSTRACT

Intermittent rivers and ephemeral streams (IRES) are increasing in coverage globally due to water abstraction and climate change. Rivers with periods of no flow may exhibit large pulses in solutes and organic matter during rewetting phases, therefore contributing to nutrient processing rates differently than perennial rivers. Although IRES constitutes more than 30% of global river networks, global carbon (C) balance of continental aquatic systems and biogeochemical processes, such as carbon cycling, used in ecosystem models does not consider IRES. During August of 2023, riverbed sediment samples from 14 stream sites (7 perennial, 7 intermittent in the San Antonio River Basin (SAR)) were collected to measure sediment grain size and organic C and nitrogen (N). If water was present, water column samples were collected to measure dissolved organic carbon, total dissolved nitrogen, and orthophosphate. Sediment and water, when present, were also collected to extract genomic DNA and perform amplicon sequencing of the 16S ribosomal RNA gene to quantify bacterial/archaeal community structure. Preliminary data indicate that when water is present, orthophosphate concentrations ranged two orders of magnitude from 0.11 mg L-1 in a perennial, urban river reach (Apache Creek) to 11.7 mg L-1 in a perennial, wastewater-fed river reach (Medio Creek). Two out of 14 intermittent reaches were flowing and, on average, had low concentrations and variance (0.2 ± 0.3 mg L-1) versus perennial (2.8 ± 4.5 mg L-1) with high concentrations and variance. Additional data is forthcoming to understand how chemical signatures and stream microbiomes vary in response to flow history.

P50 - USING MICROBIAL METAGENOMICS AS A TRACER FOR POLLUTION AND DOMINANT BIOGEOCHEMICAL PATHWAYS IN THE EDWARDS AQUIFER CONTRIBUTING ZONE

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ABSTRACT

The Edwards Aquifer spans around 3,600 square miles across central Texas and is the primary water source for San Antonio and many surrounding cities. Northern San Antonio is densely populated and is located directly above the recharge zone of the aquifer. Due to its proximity, this area contributes to groundwater contamination partially dependent on flow paths and hydrogeological features. Groundwater pollution may then impact the diversity of substrates available for biodegradation, such as sulfate, iron, and CH4 in which will dictate microbial presence in groundwater and dominant metabolic pathways involved in biogeochemical cycling. This project aims to determine the spatial, seasonal, and metabolic variation of dominant microbial taxa within groundwater environments of the Edwards Aquifer. Approximately 50 liters of groundwater will be collected from 7 wells across the Edwards and Trinity Aquifer contributing zone beginning in January 2024, and will continue every 3 months throughout 2024. Groundwater will be filtered through a 0.22 uM nitrate cellulose filter to collect microbial biomass. Genomic DNA will be extracted from collected filters and undergo quantitative polymerase chain reaction assays to determine the total abundance of both bacterial and archaeal cells present in groundwater. In addition, we will use shotgun metagenomics, which allows identification of specific gene prevalence of biogeochemical cycles, to determine pollutant or environmental-driven microbial metabolism. Geochemical testing will also occur to understand prevalence of dominant ions in aquifer groundwater. These data will allow for characterization of the predominant microbial populations and their role in biogeochemical pathways that contribute to groundwater quality.

P51 - DETECTION OF INVASIVE VIRILE CRAYFISH (FAXONIUS VIRILIS) IN THE LOWER COLORADO RIVER BASIN (ARIZONA) USING ENVIRONMENTAL DNA

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ABSTRACT

Crayfish are ecosystem engineers that alter the abiotic environment through habitat modification and other species through competition and other trophic interactions. By contrast, several invasive crayfish species are highly invasive and negatively impact native species and ecosystems. Virile crayfish (Faxonius virilis) have invaded at least 22 of 84 HUC8 watersheds within the Colorado River basin and likely have a similar negative impact in this riverine ecosystem. This study aims to detect the presence of virile crayfish species using environmental DNA (eDNA) techniques from field-collected water column samples across 119 sites encompassing each of the 11 HUC8 watersheds with at least 31 Species of Greatest Conservation Need. Approximately 300 mL of stream water was filtered (0.45 um), stored in Longmires solution, and then total DNA was extracted using chloroform-isoamyl alcohol methods. The cytochrome oxidase I (COI) gene-specific primers developed for F. virilis will be used in quantitative polymerase chain reactions (qPCR) for species detection. Total DNA has been successfully extracted from 83 of the 119 samples and concentration varies from 2 – 50 ng of DNA per uL. PCR amplification is forthcoming in spring 2023. This study will provide a spatially broad assessment of alternate techniques for invasive species detection in aquatic ecosystems to further aid conservation.

P52 - COMPARISON OF DRY AND LIVE BIOFILM MICROPLASTIC CONCENTRATIONS BETWEEN PERMANENT POOLS, EPHEMERAL POOLS, AND DETENTION PONDS IN CENTRAL TEXAS

AUTHORS

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ABSTRACT

Globally, plastic pollution has been increasing and accumulating since the 1950s in major plastic sinks, including freshwater and marine environments. The ability for plastics to degrade into smaller microplastics fragments further increases the extent of plastic pollution in the environment. Biofilm has the ability to retain and remove microplastics from suspension in surface waters due to their viscous consistency, but limited research has analyzed freshwater algal biofilm in their relation to plastic pollution. This study will compare microplastic concentrations and polymer types in biofilms among an ephemeral stream, a perennial stream, and five detention ponds. Dry and live biofilm were collected from five pools each in Leon Creek, Honeycut Spring, and five detention ponds in Central Texas. After processing, microplastics were counted under a dissecting microscope and identified by polymer type with a Fourier Transform Infrared Spectrometer. The data will be processed using R Studio and a Kolmogorov-Smirnov Test to compare the microplastic concentrations and polymer types between each sample location. Based on the results of this study, biofilm could be used in future management practices to determine the concentration of microplastic pollution in water bodies and help initiate new and innovative ways to extract and eliminate microplastics from freshwater bodies.

P53 - EFFECTS OF HUNGER AND DIET ON CANNIBALISTIC TENDENCIES IN FRESHWATER PLANARIANS (GIRARDIA DOROTOCEPHALA)

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ABSTRACT

The order Tricladida consists of freshwater flatworms known for their ability to regenerate parts of their bodies. These flatworms have specific diets, and deviating from those diets may result in shorter lifespans. Another, lesser-known characteristic of these flatworms is their tendency to be cannibalistic. It is unknown how the flatworms' tendency to cannibalize is affected by being cut from a food supply and forced to starve, the diet they have been living on prior to being starved, and whether the flatworm they would be cannibalizing is of the exact species. Here we used a mirrorless camera on a tripod to record the movements of 25 flatworms on a 3D printed circular plate. Results indicate that neither hunger nor diet has a substantial impact on a flatworm's likelihood to cannibalize another. Additionally, the early deaths of the flatworms highlight the importance of a consistent diet in keeping flatworms alive. The results support both null hypotheses that flatworms that are already cannibalistic do not become more or less cannibalistic under strenuous conditions, whether the flatworm they are cannibalizing is the same species or a sister species. This shows how animals that already show a predisposition for cannibalism are not going to change these tendencies under extreme circumstances.

P54 - DETERMINATION OF SEASONAL VARIATION IN CHEMICAL AND MICROBIAL EFFLUENT SIGNATURES IN THE SAN ANTONIO RIVER BASIN

AUTHORS

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ABSTRACT

Human population increases via urbanization intensifies the demand on wastewater treatment plants (WWTP), potentially affecting water quality, biogeochemical processes, and human health due to the chemical and biological impacts of effluent discharge on receiving streams. This study addresses the dynamics between WWTP effluent and the ecological integrity of receiving streams in the San Antonio River(SAR)Basin. These efforts focused on nutrient loading, geochemical characterization, microbial source tracking (MST), and microbiome quantification. Water samples were collected from twelve sites – upstream, at effluent discharge, and downstream of four WWTPs in December, 2023. Preliminary geochemical data for one WWTP location indicates an order of magnitude change among sampling sites, particularly for NO_3^- concentrations. Upstream site had 7.32 NO_3^- mg L^{-1}, 1.34 PO_4^{3-} mg L^{-1}, and 0 NH_4^+ mg L^{-1} whereas downstream exhibited 21 NO_3^- mg L^{-1}, 4.21 PO_4^{3-} mg L^{-1}, and 0.22 NH_4^+ mg L^{-1}. Interestingly, NO_3^- had lower concentrations in the effluent outfall (17.37 mg L^{-1}) relative to downstream, but dilution effects were apparent for PO_4^{3-} (outfall: 5.72 mg L^{-1}) and NH_4^+ (0.53 mg L^{-1}) due to lower concentrations of these solutes downstream. Additional analyses will include additional ion concentrations, the MST HF183 human fecal marker gene, total 16S ribosomal RNA (rRNA) gene for total bacterial abundance, and bacterial/archaeal microbial taxa via amplicon-sequencing of the 16S rRNA gene. The findings will provide insight into how increasingly urbanized WWTPs across SAR may impact water quality in receiving streams. This knowledge will inform future strategies for sustainable water quality management in highly urbanized settings.

P55 - UNDERSTANDING SUMMER DIE-OFFS IN SOUTHWESTERN ZEBRA MUSSEL POPULATIONS: INSIGHTS FROM ELEVATED WATER TEMPERATURES, METABOLIC DEMANDS, AND PHYSIOLOGICAL CONDITIONS

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ABSTRACT

Zebra mussels in warm southwestern U.S. waterbodies exhibit elevated growth rates with two annual spawning events. Such characteristics can result in rapid establishment of dense populations. However, large-scale summer die-offs occur in these populations which are not observed in higher latitude populations. Such die-offs have been observed in many Texas populations and occur after weeks of exposure to elevated water temperatures that remain below the published zebra mussel maximum thermal tolerance limits. These die-offs typically occur in the early fall, indicating that factors beyond temperature alone may influence the mass mortalities. Elevated water temperatures induce indirect impacts characterized by heightened metabolic demands. As water temperatures rise, zebra mussel metabolic rates increase as feeding efficiencies decrease. In this study, we compared the daily mean water temperatures and physiological condition of living zebra mussels from Stillhouse Hollow Lake in September 2022 and 2023. Lake water temperatures were logged hourly the month prior to collection and were significantly warmer in 2023 (mean = 30.38°C) compared to 2022 (mean = 29.72°C) ($p=0.0001$). Zebra mussel physiological condition was estimated by calculating dry tissue weight (mg) to shell length (mm) ratios. Based on these ratios, physiological conditions were reduced in the 2023 mussels (2002 mean = 0.071±0.021; 2023 mean = 0.057±0.019, $p=0.005$), which suggest that mass mortality events during this time may be due to starvation associated with increased metabolic demand. This observed summer/fall starvation period is likely a major contributor to the large-scale die-offs observed in populations at southern latitudes.

P56 - ASSESSING THE NEED TO FEED ZEBRA MUSSELS (DREISSENA POLYMORPHA) DURING LABORATORY TESTING STUDIES

AUTHORS

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ABSTRACT

The population dynamics and ecological impacts of invasive zebra mussels (Dreissena polymorpha) in northern latitudes of Europe and North America have been well-studied. Their relatively recent establishment in southern U.S. waterbodies, however, has stimulated additional research interest on their ecology, physiology, and control in low-latitude systems

because of their increased growth rates, semiannual spawning events, and boom-and-bust population dynamics. In order to conduct reliable studies in the lab on these low-latitude populations where numerous factors can be controlled, efficient methods of maintaining mussels during laboratory testing is needed. We measured the time to mussel mortality of fed vs unfed mussels to assess the need for feeding during laboratory testing. Mussels were collected in June and September from Stillhouse Hollow Lake. Following a two-week acclimation period in the lab, all mussels were housed 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. Although there were slightly significant differences in mortality time of mussels receiving food in June vs. September (p=0.0243), there were no difference between the fed and unfed mussels overall. It is possible that mussels were not fed adequately for a difference to be detected or that feeding mussels during laboratory testing is simply not needed. Future studies will alter feeding frequencies to determine if feeding impacts survival outcomes for zebra mussel laboratory studies.

P57 - ASSESSING THE IMPACT OF ELEVATED SUMMER TEMPERATURES ON THE PHYSIOLOGICAL CONDITION OF ZEBRA MUSSEL POPULATIONS IN SOUTHWESTERN U.S. LAKES

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ABSTRACT

Zebra mussel (Dreissena polymorpha) populations in low-latitude water bodies have been shown to have shortened life spans and large-scale summer die-off events relative to populations at higher latitudes. A primary indirect effect of chronic exposure to increased temperatures is increased metabolic demand. With temperature increases from 20 to 32°C, zebra mussel oxygen consumption rates can quadruple and metabolic rates increase by as much as 265%. Feeding efficiency also declines with increasing temperatures. In this study, we assessed the physiological conditions of zebra mussels from Stillhouse Hollow Lake in early and late summer of 2023 to determine if a predicted reduction in physiological condition occurs in the mussels following elevated summer temperatures. Mussels were collected from the lake in June and September on settlement plates 2m below the water surface. Shell lengths and dry soft tissue weights were measured, and dry tissue weight to shell length ratios were calculated. Significant physiological condition declines were detected in larger mussels (16-20mm) in the late summer cohort but not in smaller mussels (11-15mm), supporting previous findings that elevated summer temperatures impact larger mussels more than smaller mussels. Such impacts likely result from mussel starvation due to the elevated metabolic demands associated with increased temperature regimes and the reduced feeding efficiency that's been reported in the literature. Data from Texas zebra mussel populations, including this study, are critical for implementing effective management and mitigation strategies for impacted aquatic systems in subtropical North American lakes in both the short and long terms.

P58 - ADAPTING TO THE HEAT: INVESTIGATING THE EVOLVING THERMAL TOLERANCE P58 - LIMITS OF ZEBRA MUSSELS (DREISSENA POLYMORPHA) IN WARM TEXAS WATERBODIES

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ABSTRACT

Zebra mussels (Dreissena polymorpha) are an aquatic invasive species native to the Black, Caspian, and Azov Seas of Europe. They were first reported in the Great Lakes of North America in 1988. Although their long-term establishment in warm aquatic systems at southern latitudes was originally questionable, they have successfully spread south and currently occur throughout the state of Texas (at least 30 well-established, reproducing populations). Their establishment and continuous expansion south is likely due to an increasing tolerance for warmer waters. To understand the thermal limits of these Texas populations, we conducted laboratory experiments using mussels collected from Stillhouse Hollow Lake during the late spring and early fall of 2023. Zebra mussels were exposed to constant temperatures at and above their reported thermal tolerance limits from northern-latitude studies conducted in Europe and North America. Those studies reported thermal tolerances limits of 28°C (Europe) and 30-32°C (North America). In our study, a major decline in thermal tolerance occurred between 32°C and 33°C, suggesting a long-term thermal tolerance of Texas mussels being higher than 32°C but lower than 33°C. We also observed the time until death for mussels collected in late spring and early fall showed no significant difference at 30°C and 31°C. However, mussels collected in early fall exhibited significantly elevated thermal tolerances at 32°C, 33°C, and 34°C. These findings indicate that mussels in warm Texas water bodies have evolved increased thermal tolerances, and exposure to high summer temperatures further enhances their thermal tolerance within a single season.

P59 - ASSESSING THE RISKS OF A POTENTIAL ZEBRA MUSSEL (DREISSENA POLYMORPHA) INVASION IN A TAYLOR COUNTY TEXAS LAKE BASED ON WATER QUALITY DURING DROUGHT PERIODS.

AUTHORS

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ABSTRACT

As of 2023, thirty Texas lakes are infested with zebra mussels, with invasions expected to continue. West Texas, known for being drought-ridden, is beginning to see zebra mussel invasions. These invasions are often linked to areas experiencing exceptional periods of drought, raising concern for non-infested lakes in the region. Currently, zebra mussels have not yet invaded Taylor County, however, neighboring counties like Brown County, have already been affected. Given the proximity of Brown County and their similar environmental and drought conditions, there is a high risk of zebra mussel invasions in Taylor County. Therefore, evaluating the water quality can help create a model to predict the survival rate of zebra mussels in Taylor County. This study aims to evaluate water concentrations and geographical factors of Lake Brownwood and Lake Ft. Phantom to identify patterns of environmental conditions and determine if Taylor County is at high risk for a zebra mussel invasion. Sampling various locations in a lake and comparing the data to zebra mussel tolerances can determine the risk of an established population. Understanding where zebra mussels settle, and the substrate and vegetation that allow settlement, can establish a pattern to see if a lake is geographically viable. It is anticipated that the environmental conditions conducive to a zebra mussel invasion will be present in Taylor County. The observed factors leading to this expectation may include but are not limited to, water temperature, water pH, and calcium concentration.

P60 - IMPLICATIONS FOR POPULATION DYNAMICS OF TEXAS ZEBRA MUSSELS (DREISSENA POLYMORPHA): INVESTIGATING THE THERMAL TOLERANCE LIMITS ACROSS MUSSEL SIZE CLASSES

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ABSTRACT

Native to Europe, zebra mussels were inadvertently introduced into Lake St. Clair in 1988. Subsequently, they spread southward via the Mississippi River and its tributaries throughout the 1990s-2000s, eventually reaching Lake Texoma in Texas in 2009. Zebra mussels have caused multimillions of dollars in damages via biofouling of civil infrastructure as well as negatively impacted endemic Unionoid and Margaritifera mussel populations. Initially, the warm-water temperatures of low-latitude lakes were expected to act as an intrinsic barrier to arrest any foothold population from establishing itself long-term, but evidence now suggests they've adapted to elevated water temperatures and are well-established in the southern U.S (including at least 30 Texas lakes). In this study, we investigated maximum thermal tolerance limits of central Texas zebra mussels. We specifically assessed mortality time in relation to mussel size when mussels were exposed to constant temperatures at or above their reported limits (30°C-34°C). Mortality was monitored every 12-h until all mussels were dead. Results indicate that larger mussels died faster when exposed to temperatures at the high-end of their known maximum thermal limits (30°C-32°C). However, at temperatures exceeding 32°C, mussel size no longer influenced mortality timing, as all mussels exhibited similar, reduced survival times. These results suggest a maximum thermal tolerance limit of Texas mussels to be between 32°C-33°C and that larger mussels are less likely to survive when exposed to temperatures above 30°C. This finding likely explains the one-year lifespans reported in Texas populations compared to lifespans of several years observed at northern latitudes.

P61 - REASSIGNMENT OF TRYONIA DIABOLI AND TEXAPYRGUS LONGLEYI.

AUTHORS

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ABSTRACT

Freshwater Invertebrates are, in our opinion, an under researched area in modern science. Our work aims to identify and describe Texas invertebrates, including two distinct snail species found in the Devil's River in Southwest Texas. Tryonia diaboli was named in 1906 from river drift and Texapyrgus longleyi in 1991 from a small stream running into the Devil's River. The original description of T. diaboli was quite short and the sketch of this species lacks detail. Previous data classify these snails as different species due to the patterns on their shells, with Texapyrgus having deep lines in a crisscross pattern, and Tryonia

having a smoother finish. But the shells of these species overall are quite similar in appearance. We will use DNA sequences to determine if there is support for two species or if they should be synonymized. As of now, DNA sequencing data has been consistent with our hypothesis, showing that both snail species need to be synonymized and described together. Further sequencing work is soon to be completed using a different set of DNA primers in order to further reinforce our claim. If our data comes back supportive, a manuscript will be published to synonymize the species and place it into the correct genus among the phreatic Cochliopidae, furthering our goal of correctly identifying and describing freshwater invertebrates throughout the State of Texas.

P62 - ASSESSMENT OF THE CURRENT STATUS OF THE TEXAS HORNSHELL, POPENAIAS POPEII (BIVALVIA: UNIONIDAE) FROM THE RIO SABINAS OF NORTHEASTERN MEXICO.

AUTHORS

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ABSTRACT

The presence of the Texas Hornshell in the Rio Sabinas of northeastern Coahuila was first reported in 2004. The Rio Sabinas was dry at the time and only dead shell specimens were collected; the presence of living specimens was questioned. Following its listing as an Endangered Species by the Fish and Wildlife Service in 2018, there was an increased interest in the status of the northern Mexico populations by workers at Miami University of Ohio. Despite multiple efforts, this species was never reported as currently living in the Rio Sabinas drainage system. There are currently less than a half dozen known populations of this species in the U.S. and Mexico. This current study will be undertaken to utilize new and improved technologies such as eDNA analyses to determine the presence of any living populations. The presence of an additional population of this species would provide a significant resource/contribution in the continued conservation efforts to recover this species. Prior studies in 2023 included field trips to known populations in New Mexico and Coahuila. These trips were designed to improve methods in both collecting and monitoring field techniques. The population in the Rio San Diego in northeastern Coahuila was sampled, measured, DNA swabbed, and returned to their original collection site in late August 2023. Additionally, field techniques were improved by participation in the annual on-site monitoring of the Black River population in southeastern New Mexico by Miami University and the New Mexico Department of Game and Fish in mid-September of 2023.

P63 - ESTIMATION OF METABOLIC REGIMES OF HARMON CREEK FROM CONTINUOUSLY MONITORED DATA

AUTHORS

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ABSTRACT

Ecosystem metabolism, which encompasses gross primary production (GPP) and ecosystem respiration (ER), serves as a fundamental indicator of the structure and function of an ecosystem. Within streams and rivers, GPP is quantified as the amount of oxygen generated through photosynthetic processes by autotrophic organisms whereas ER is assessed by measuring the consumption of oxygen by both autotrophs and heterotrophs. We estimated daily fluxes of ecosystem metabolism for 12 months in Harmon Creek, a small perennial river in Huntsville, Texas (U.S.A.) via modeling high temporal frequency data of dissolved oxygen, temperature, light, and barometric pressure. Harmon Creek was heterotrophic daily where ER ranging from -0.3 to -15.4 g O_2 $m^{-2}d^{-1}$ and GPP ranging from 0.01 to 3.3 g O_2 $m^{-2}d^{-1}$. GPP was lower in Harmon Creek whereas ER depicted a similar range as that of different aquatic ecosystems such as mid-size rivers, small streams, sub-alpine streams, sub-tropical and tropical streams. Our results demonstrate how ecosystem metabolism in Harmon Creek shows heterotrophy with higher rates of ER (mean ER= -4.63 g O_2 $m^{-2}d^{-1}$) exceeding the GPP (mean GPP= 1.38 g O_2 $m^{-2}d^{-1}$) thus resulting in negative net ecosystem production (NEP) (mean NEP= -3.24g O_2 $m^{-2}d^{-1}$). Our estimations of GPP and ER provide understanding of the ecosystem-scale productivity and respiration of Harmon Creek. The Harmon Creek ecosystem is heterotrophic on an annual basis with very low GPP, indicating a likely reliance of subsidies from the surrounding terrestrial ecosystem. We will further discuss the mechanisms driving the temporal patterns of GPP and ER.

P64 - PRESENCE OF BATRACHOCHYTRIUM DENDROBATIDIS (BD) ON AMPHIBIANS AND IN ENVIRONMENTAL SAMPLES IN WEST TEXAS

AUTHORS

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ABSTRACT
Batrachochytrium dendrobatidis (Bd) is an emerging amphibian pathogen that can cause rapid population declines and species extinction. Previous sampling in Lubbock, Texas 2011 found no presence of Bd on amphibians; however, 2020 sampling by a team of Texas Tech University undergraduates using environmental DNA (eDNA ; DNA collected in bulk environmental samples), found the pathogen in a local playa lake, suggesting that either Bd had moved to the Lubbock area in the last decade or that Bd is existing in the environment but is not infecting local amphibians. To determine if Bd is present on amphibians and in the environment at addition sites in Lubbock, we collected samples from five urban playa lakes that had previously been shown to support amphibian populations in multiyear studies using eDNA samples, amphibian swabs, environmental measurements, and amphibian species surveys at each lake. We found eDNA evidence of Bd at multiple tested sites and on swabbed amphibians. The percentage of sites where we found Bd was 20% and the percentage of sites positive by eDNA was 17%. We also found that there was a 16% Bd prevalence on amphibians overall, with a 45% prevalence in the species Lithobates catesbeianus, and 7% in Gastropareses olivacea, but no detections in Pseudacris clarkii or Anaxyrus speciosus. Our research suggests that there is a growing presence of Bd in urban playas of Lubbock and warrants continued pathogen monitoring.

P65 - PERFORMANCE OF FOUR LOW IMPACT DEVELOPMENT RETENTION BASINS OVER THE EDWARDS AQUIFER RECHARGE ZONE IN SAN ANTONIO TEXAS

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ABSTRACT
Rapid urban development occurring over the Edwards Aquifer threatens water quality, particularly groundwater, but low impact designs (LIDs) can help reduce pollution runoff and manage stormwater. LIDs in the form of retention basins were built on the University of Texas at San Antonio campus to mitigate the effects of urbanization on the Edwards Aquifer. We compared peak flow attenuation and water quality treatment of four campus basins (East Campus 1, East Campus 2, Living Lab and Main Campus) with varying design specifications and vegetation conditions. After completion, all basins were effective in capturing runoff and reducing peak flows downstream post-construction. The water quality impacts varied between basins; East Campus 2 deviated most from design guidelines, resulting in slow infiltration rates and poor treatment effectiveness for total suspended solids. However, low traffic in the contributing parking lot and higher water quality pre-infiltration may have masked treatment effects. Living Lab and Main Campus basins more closely matched design guidelines, had higher plant diversity, and showed improved water quality compared to other sites. Beyond managing stormwater, the Main campus basin enhanced the aesthetic of the campus, served as an educational tool for LIDS, and provided a communal green space. This emphasizes the impact of proper construction in basin effectiveness for managing stormwater and enhancing environmental quality.

P66 - FRESHWATER TOXINS IN SEASONAL AND YEAR-ROUND ENVIRONMENTS IN TEXAS

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ABSTRACT
Freshwater systems are a vital resource for humans and animals, but due to frequent harmful algal blooms (HABs), there have been significant negative impacts worldwide. These negative impacts from HABs include, but are not limited to, creating problems for animal welfare due to their toxicity and economic loss for landowners. Unfortunately, information and experiments are lacking in regard to the types and distribution of algal toxins in smaller waterbodies throughout Texas. Despite the lack of information, being able to identify the toxins present, where they occur, and the water chemistry of these freshwater systems is an important first step towards understanding and minimizing the risks associated with HABs. Microcystins are a group of toxins of interest. They are potent hepatotoxins and possible carcinogens leading to physiological changes in various animals. For this experiment, year-round and seasonal waterbodies were surveyed using well established methods such as Solid Phase Absorption Toxic Tracking (SPATT) for the presence of harmful algal toxins to wildlife and agriculture. The data gathered and analyzed from these experiments can be used to understand the risks associated with harmful algal blooms and provide various mitigation measures.

P67 - FORAMINIFERA AND OSTRACODA ASSEMBLAGES OF THE MIDDLE EOCENE WECHES FORMATION IN NACOGDOCHES COUNTY, TEXAS

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ABSTRACT

Microfaunal assemblages of foraminifera and ostracods were collected from three stratigraphic intervals within the upper part of the Lutetian (middle Eocene) Weches Formation in Nacogdoches County, Texas. The Weches Formation is a medium to dark grayish- to greenish-brown transgressive mudstone that lies between the underlying Queen City Sandstone and the overlying Sparta Sandstone. Compositionally, the Weches Formation primarily consists of siliciclastic clay and silt, minor amounts of fine quartz sand, locally abundant altered “glautonic” pellets, iron oxides (e.g., limonite), and many species of marine invertebrates. These faunas include echinoids, corals, gastropods, bivalves, scaphopods, sparse cephalopods, foraminifera, and ostracods. The present study was concerned with the latter two fossil groups, which are the dominant elements of the microfauna recovered from the Weches Formation. Of the three sampling sites, only the University Drive locality yielded intact specimens of foraminifera and ostracods. The most common foraminiferal taxa collected include Subbotina spp., Lamarckina claibornensis, and Siphonina claibornensis. Overall, the benthic forms (e.g., Lamarckina, Siphonina) exhibit greater diversity than the planktonic species (e.g., Subbotina). Of the ostracod specimens collected, Trachyleberis linospinosa and Hermanites claibornensis were in greatest abundance. Most ostracod samples collected were poorly preserved or not complete enough to be confidently identified. Although the South Street locality did not yield intact specimens, internal molds of hauerinid miliolid foraminifera were recovered, indicating a nearshore depositional environment. The Lake Nacogdoches sampling site did not yield any microfossils and the allochems were dominated by altered pellets.

P68 - THE PEDIASTRUM ACME BIO-EVENT. AN EASY TO IDENTIFY EARLY CONIACIAN BIOSTRATIGRAPHIC MARKER WITHIN THE YOLA BASIN, NIGERIA

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ABSTRACT

The Yola Basin in the Northern Benue Trough is an emerging petroleum province with great potential to be one of Nigeria’s important energy and economic producers. The Upper Cretaceous succession of the Yola Basin has been under scrutiny to evaluate and characterize its organic content and hydrocarbon source potential. The stratigraphy of the basin remains preliminary and poorly understood, especially when it comes to well-defined biostratigraphic markers. During an earlier palynological study, we established the Pediastrum Acme Bio-event from one section within the Numanha Formation which we interpreted to indicate early Coniacian age. The present study identifies the same event from another section within the Numanha Formation – confirming its basin-wide existence and showing its potential to be a prominent, easy to identify biostratigraphic marker. The marker horizon was identified by counting 400 palynomorph grains from each of the studied 25 outcrop samples which represent a 35m section. Out of all the palynomorphs counted, Pediastrum accounted for 4.75 to 53.75%, reaching its acme in sample 8 at 9 m from the base of the section.

P69 - CHARACTERIZING AND DETERMINING THE APPROPRIATE CLASSIFICATION OF METEORITE NWA 725

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ABSTRACT

Meteorites appear in many environments on Earth and most commonly in deserts as they are easier to find in such a location. There are many different types of meteorites, each varying in specific classifications. The main ones are iron, stony, and stony-iron. The meteorite sample NWA 725 is classified as a primitive stony meteorite and has undergone many switches in classification naming conventions over the years from acapulcoite to winonaite and back to the former. The reason for this is the overlap of the classification factor percentages of oxygen isotopic and mineral compositional data. To better understand NWA 725 and give it an appropriate name, we first took the necessary measures to gather data using SEM (Scanning Electron Microscope) and point count analysis with petrographic microscopes. From the data gathered and researched we can see that NWA 725 is most likely equivalent to the winonaite classification as compared to previously being known as an acapulcoite. This is based on the mineral weight percentages we gathered using the point count analysis method as well as major chemical elemental data found using a SEM and the oxygen isotopic of NWA 725 found through research. The most abundant weight percentage traceable minerals within this meteorite found using the aforementioned methods are orthopyroxene, olivine, plagioclases, and clinopyroxenes. As we put together more information on this meteorite it will give us better insight into the origin of NWA 725 as well as possibly conclude the ongoing toss-up of its proper classification, acapulcoite or winonaite.

P70 - REEF FISH ASSEMBLAGES OF THE MESOAMERICAN BARRIER REEF IN ROATÁN, HONDURAS

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ABSTRACT

Global fish populations are declining rapidly due to anthropogenic climate change and human activities. Frequent disturbances are causing reef specialists to be replaced by generalist species who continually adopt original functions, resulting in an overall trend of reef homogenization. Over the last three decades, the Mesoamerican Barrier Reef (MBR) has experienced multiple stressors which have contributed to a rise in depauperate reefs and shifts in fish assemblages. Frequent surveys are needed to assess reef function and apply appropriate management strategies. This study assessed the species diversity of shallow reef fishes of the MBR in Roatán, Honduras. A team of three divers followed a modified Reef Life Survey method and recorded all fishes observed along a 25 m transect. Seventy-two species of fish were observed across five dive sites, and the Shannon-Wiener index was used to assess species diversity. The highest diversity was recorded at Bear's Den where H'=2.73. Tuk's Treasure had the lowest diversity with H'=1.60, however it also supported the highest fish abundance due to large schools of fishes. Currently, the reef is in a depauperate state where algal species are more dominant than coral. However, 51% of the fishes observed are, to some extent, algivorous, and this high herbivorous activity can decrease macroalgal concentrations and create space for juvenile coral recruitment. Roatán's reef specialists made up 62% of the fish species observed, and 78% of the reef fish abundance. Additional surveys are needed in this area to track potential shifts from reef specialists to generalist fish species.

P71 - ABUNDANCE AND DISEASE STATUS FOR STARLET CORALS IN THE BAY ISLANDS, HONDURAS

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ABSTRACT

Coral reefs support fish, hard corals, and plants. Starlet corals are a group of hermatypic corals that are a primary reef building species. Coral reefs are declining due to infectious diseases that are increasing at alarming rates. Two of the most prominent diseases affecting starlet corals are Dark Spot Syndrome (DSS) and the newly emerging Stony Coral Tissue Loss Disease (SCTLD). DSS is a disease that affects the symbiotic zooxanthellae, most commonly within the starlet corals, Siderastrea siderea, Stephanocoeania intersepta, and Siderastrea radians. DSS is known to cause nonlethal dark lesions that can persist on a coral colony for years, weaking the immune system and the $CaCO_3$ skeleton. SCTLD produces lethal lesions on stony corals, resulting in rapid tissue decay and becoming the deadliest coral disease. This study was conducted to assess starlet coral abundance and disease status on the Mesoamerican Barrier Reef in Roatán, Honduras. Field sampling was conducted using the Randell-Robertson Marine Survey Technique to locate starlet coral species on the reef. Once identified, species, health status, and disease coverage were recorded. 86% of Siderastrea siderea was affected with DSS (n=75) and 53% of Siderastrea radians (n=28) were affected by DSS. Only one Stephanocoeania intersepta was recorded and was found to be healthy. No starlet coral species were observed with active SCTLD. Our data suggest that Siderastrea is at higher risk of DSS than SCTLD.

P72 - FISH DIVERSITY IN ROATÁN, HONDURAS

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ABSTRACT

The balance of herbivorous fish and carnivorous fish is vital to the health of a marine ecosystem. Herbivorous fish play a role in the regulation of competition between algae and corals, and carnivorous fish are significant regulators of herbivorous fish in reef ecosystems. Assessing diversity within fish populations can provide an understanding of the health of the coral reef ecosystem. This study was conducted in Roatán, Honduras to assess and compare fish diversity in different sites using the Shannon Weaver Diversity Index. Data was collected from May 6 - May 13, 2023, at five sites near pollution and boat traffic along the northwest side of the island using the roving diver technique (RDT). The study showed that the site Bears Den had the highest diversity index (H=2.704) while Fish Den had the lowest diversity index (H=1.928). When compared to their maximum diversity potential and evenness, Melissa's Reef was closer to its potential, and species were more evenly observed in comparison to Bear's Den, despite Bear's Den having the highest diversity. Tuk's Treasure had a greater difference between its potential diversity index and its observed diversity index indicating Tuk's Treasure was more imbalanced than Fish Den despite having a higher diversity index. Overall, each dive site had greater than a 1.5 diversity index, meaning all five sites met the diversity benchmark. Future studies would benefit by having researchers snorkel to better assess the fish at shallower depths, and researchers will be diving for data collection at deeper depths.

P73 - UTILIZING YOLO V.8 COMPUTER VISION MACHINE LEARNING ALGORITHM FOR RECOGNITION AND MEASUREMENT OF ZEBRA MUSSEL SPECIMENS IN A LABORATORY SETTING

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ABSTRACT

Zebra mussels are an invasive species from Europe that have recently become well-established at southern latitudes in North America. Understanding their population dynamics at such latitudes is critical to developing population management and mitigation strategies. Such population studies typically require significant sample sizes and laborious manual measurements to monitor population cohort sizes, growth rates, lifespans, etc. This study explores the application of the YOLOv8 algorithm, a computer vision model (CVM), to identify and measure zebra mussels within a laboratory setting. The research applies YOLOv8 for high-precision tasks in a biological context, addressing the complexities of the specimens' varied characteristics, and constructing a dataset designed to refine detection models, demonstrating impressive accuracy in specimen identification and measurement. The model output was compared to three researchers' manual measurements of zebra mussel shell lengths, correctly recognizing all mussels on a scanned image and provided shell length measurements within the standard deviations of 73.8% manual measurements. This study demonstrates the potential of machine learning algorithms like YOLOv8 to be integrated into data collection methods in biological and ecological studies by incorporating CVMs into different phases of the research. The primary challenge addressed here was the implementation of CVMs in the data collection and processing phase for zebra mussel measurement. The YOLOv8 algorithm, trained on high-resolution scanner images, demonstrates its capability to recognize and measure mussel shell lengths in pixels which can be converted to metric units. These findings suggest that using CVMs introduces a process improvement to work with biological specimens.

P74 - FIGHTING CRIME WITH AI: SUSPECT IDENTIFICATION FROM SHOEPRINT IMPRESSIONS

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ABSTRACT

Shoeprints are one of the most common types of evidence left behind at crime scenes, which are just as important as fingerprints to find a suspect. The determination of an individual's gender and shoe information through shoeprint impressions is a labor-intensive process demanding specialized expertise because of the specific patterns a shoeprint creates. Predominantly employed in forensic sciences, this technique aids in the identification of a suspect's gender, shoe size, and the type of shoe they were wearing. This study aims to streamline and expedite the gender and shoe identification process by leveraging deep learning methodologies applied to a dataset, 2D Footwear Outsole Impressions, that contains 1,500 2D images of 150 pairs of shoes that were scanned 5 times per shoe. The adoption of a convolutional neural network (CNN) is central to this endeavor, exploiting its capacity to discern patterns within extensive datasets. Through a meticulous training regimen involving an 80/20 data split and validation via cross-validation techniques, the CNN is poised to outperform

other traditional machine learning models for image classification. The intrinsic ability of CNNs to extract features and spatial patterns from images, positions them as the optimal choice for this research work. Anticipating accurate gender, shoe size, and type of shoe predictions from 2D shoeprint images, this research aspires to enhance efficiency in forensic gender and shoe size identification offering a notable advancement in both time and resource savings.

P75 - DEVELOPING MACHINE LEARNING MODELS TO PREDICT ORAL CANCER

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ABSTRACT

Oral cancer presents a significant global health challenge, emphasizing the importance of early detection for improved patient outcomes. Despite our knowledge of certain risk factors such as smoking status and histology, our ability to predict oral cancer risk remains inadequate. In this research, our objective was to identify and characterize certain patient characteristics (including smoking and alcohol habits, as well as histology at baseline) and key genes associated with cancer development by analyzing gene sets from both cancerous and non-cancerous patients. Using R programming, we developed several predictive models using three machine learning classifiers: logistic regression, K-nearest neighbor, and naive Bayes. We assessed the accuracy of these models by considering patient characteristics, significant genes, and a combination of both. Remarkably, the predictive model for significant genes consistently achieved the highest accuracy, with logistic regression and naive Bayes reaching an impressive 74% accuracy, and K-nearest neighbor reaching 63%. However, the most accurate predictive model overall was the combination of patient characteristics and significant genes, achieving a remarkable 84% accuracy. Notably, naive Bayes outperformed the other classifiers, demonstrating accuracy levels ranging from 10% to 40% higher. By identifying significant genes contributing to cancer, we further uncovered crucial biological pathways. These findings provide valuable insights into the genetics of oral cancer, paving the way for improved early detection strategies and potentially reducing global cancer-related mortality rates.

P76 - COGNITIVE IMPROVEMENT AND PREFRONTAL FUNCTIONAL CONNECTIVITY IN INDIVIDUALS WITH REMITTED BIPOLAR DISORDER AFTER TRANSCRANIAL INFRARED LASER STIMULATION

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ABSTRACT

Bipolar disorder involves compromised prefrontal cortical function and disruptions in brain networks mediating cognition. Deficits in executive function and attention are present even in euthymic individuals. These neurocognitive deficits in individuals with remitted bipolar disorder may be ameliorated by targeting prefrontal cortex with transcranial infrared laser stimulation (TILS), a safe, non-invasive intervention that enhances brain metabolic energy production. This ongoing study recruited n=17 individuals with remitted bipolar disorder (type I or II) who underwent weekly TILS sessions (1064-nm wavelength; 0.25 W/cm^2; bilaterally applied to the frontal poles; 10 minutes per session) over 6 consecutive weeks. Functional connectivity in prefrontal cortex was assessed using functional near-infrared spectroscopy both at rest and during a cognitive task (the 2-back task, which assesses working memory and attention), before/after each TILS session. Repeated measures ANOVA was used to analyze changes in performance on the 2-back task and an index of functional connectivity. Participants showed significant improvement in both number of successful responses and reaction time ($p<0.05$) in the 2-back task after weekly TILS treatment. Functional connectivity was increased during the rest phase and decreased during the 2-back task ($p<0.01$), indicating greater synchrony/desynchrony in prefrontal cortex, respectively. Functional connectivity differences reflect neuroplastic changes in prefrontal cortex driven by increased cognitive demand of the 2-back task. Task improvement is consistent with previous findings of cognitive enhancement in adults without psychiatric conditions after

TILS, indicating its potential to improve cognition in individuals with remitted bipolar disorder. Support: Elhapa Foundation, Oskar Fischer Project, Milken Institute, Baszucki Brain Research Fund

P77 - THE USE OF TRYPTOPHAN CQDS FOR THE TREATMENT OF NEURODEGENERATIVE DISEASES

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ABSTRACT

Degenerative diseases such as Parkinson's and Alzheimer's have been associated with the loss of functionality in neuronal cells, especially in the brain. Genetics have been observed
as a possible cause for these diseases, but other factors include the accumulation of amyloid fibrils. The selective membrane that protects the neurons of the central nervous system is known as the Blood Brain Barrier (BBB). The BBB helps maintain homeostasis, regulate efflux and influx, and protect the brain from pathogens. Previous studies have
indicated that the formation of amyloid fibrils (self-assembled fibrous protein aggregates) is the cause of amyloidosis, which can lead to neurodegeneration. Carbon Nanomaterials (CNMs) have the ability to pass through the BBB without damage to the organism, which
is why their application is the primary focus of this project. The main purpose of the research lab is to find possible therapeutic approaches to halting, reversing, or avoiding this fibril formation. Carbon Quantum Dots (CQDs) can be synthesized from any carbon source, they are non-toxic and soluble in water. CQDs have been found to be effective against amyloid fibrils, as they reverse and avoid their formation. Currently, we are working with tryptophan CQDs, as we hypothesize that they can easily cross the BBB. Once characterized, these measurements are used to confirm the ability of the CQD to quench the fluorescence of Hen-Egg-White Lysozyme fibrils, which are a model amyloid protein. Further studies will include testing the ability of the Tryptophan CQDs to decrease oxidative stress in a cell and nematode model.

P78 - CITRATE AND LACTATE PROMOTE THE PROGRESSION OF GLIOBLASTOMA THROUGH ACTIVATION OF TUMOR ASSOCIATED MACROPHAGES

AUTHORS

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ABSTRACT

Glioblastoma (GBM), the most aggressive primary brain tumor, presents a grim prognosis for afflicted individuals, marked by high resistance to therapy. GBMs are highly angiogenic and profoundly influenced by the tumor microenvironment (TME), which has become a focus for therapeutic exploration in multiple cancers, including GBM. Within the TME, tumor-associated macrophages (TAMs) exhibit two distinct phenotypes: pro-inflammatory M1 and anti-inflammatory M2. These immune cells profoundly impact tumor progression. This study explores the metabolic interplay between GBM cells and TAMs, specifically seeking to investigate the influence of citrate and lactate on GBM tumors and TAMs and their role in GBM advancement. The gene expression analysis of GBM tumors and TAMs, alongside survival analysis of GBM and TAM markers was conducted. The findings revealed a strong correlation between poor prognosis and elevated expression of M2-like TAM markers, such as CD163 and histone demethylase (KDM). Moreover, citrate and lactate emerged as critical metabolites, influencing alpha-ketoglutarate (α-KG) production and promoting M2 macrophage polarization.
In conclusion, this study unveils the crucial roles of citrate and lactate in TAM polarization and the progression of GBM. Targeting citrate and lactate metabolism presents a potential avenue for improving immunotherapeutic approaches in GBM. Future research should focus on identifying biomarkers associated with citrate and lactate metabolism and delve into the intricate mechanisms by which these metabolites influence TAM polarization and the overall progression of GBM.

P79 - TRANSCRANIAL INFRARED LASER STIMULATION (TILS) IMPROVES NEUROCOGNITIVE PERFORMANCE IN INDIVIDUALS WITH REMITTED BIPOLAR DISORDER

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ABSTRACT

Bipolar disorder is characterized by episodes of mania or hypomania and depression, often accompanied by neurocognitive difficulties. Even during remission, individuals with bipolar disorder commonly experience cognitive dysfunction, primarily in processing speed, attention, verbal memory, and executive function domains. Transcranial infrared laser stimulation (TILS) non-invasively enhances both brain oxygenation and cognition in healthy adults. In studies involving individuals with bipolar disorder, TILS has demonstrated safety, enhanced brain oxygenation, and provided preliminary evidence of improved cognitive flexibility and impulsivity. We aim to further identify effects of TILS on aspects of cognition mediated by the prefrontal cortex in people with bipolar disorder. The impact of TILS on cognition, specifically executive function, in participants with bipolar disorder is unknown. In this ongoing study, we enrolled 20 individuals with remitted bipolar disorder. Participants received weekly ten-minute TILS treatments (1064 nm laser, 250 mW/cm^2) for six weeks, administered to the bilateral frontal poles (BA10). The trail-making task (TMT) and portions of the Cambridge Neuropsychological Test Automated Battery (CANTAB) were given prior to the first and following the last TILS. Wilcoxon signed-rank tests compared performance before and after TILS sessions. After six weeks of TILS, participants demonstrated significantly improved speed of response inhibition, target detection during a sustained attention task, cognitive flexibility, and TMT completion time. Results provided support for most hypotheses generated a priori. These findings support repeated TILS treatments as an intervention to improve executive function in people with remitted bipolar disorder. Support: Elhapa Foundation, Oskar Fischer Project, Milken Institute, Baszucki Brain Research Fund.

P80 - THE 24 HR LOCOMOTOR ACTIVITY OF DAY-NIGHT ANTICIPATION IN DROSOPHILA SIMULANS AND DROSOPHILA SECHELLIA

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ABSTRACT

Locomotion is a well-conserved behavior, vital for survival and influenced by a combination of internal and external mechanisms. In a collaborative NSF-funded project to identify genetic loci that influence an organism to explore its environment, we measured and characterized the 24-hour circadian-controlled locomotive profiles of two sister species, Drosophila simulans, Drosophila sechellia, along with their interspecies lines (each containing 12.5% D. sechellia loci and 87.5% D. simulans loci), using the Drosophila Activity Monitor (DAM) assay. Specifically, we examined over 100 lines and quantified 4 locomotive parameters - day activity, night activity, day anticipation, and night anticipation. We wanted to know whether there was any correlation between their levels of exploration with any of the above parameters using correlation analysis. Our results showed weak or no correlation between most of the phenotypes, suggesting the complexity of the genetic landscape underlying locomotion and exploration, consistent with previous studies. Furthermore, our collection of D. simulans, D. sechellia and interspecies lines can serve as a great tool to unravel the genetic mechanisms underlying locomotion.

P81 - DENDRITE STRUCTURE AND TOPOGRAPHY OF FACIAL MOTOR NEURONS IN LARVAL ZEBRAFISH (DANIO RERIO)

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ABSTRACT

During early development, hindbrain neuron cell bodies exhibit spatial topography that predicts their functional properties. For example, in larval zebrafish (Danio rerio), facial motor neurons exhibit dorsoventral topography according to age, motor pool, and activity pattern (McArthur & Fetcho 2017). Dorsal facial motor neurons typically fire only in conjunction with attempted whole-body movements, while ventral facial motor neurons also exhibit rhythmic activity -- consistent with the role of facial motor neurons in respiratory behavior in fish. In this model system, what is the mechanism linking dorsoventral cell body position to functional output? One possibility is that cell body topography is matched by dendrite topography, such that facial motor neurons with dorsal and ventral cell body locations have dendrites located in more dorsal and more ventral regions of the neuropil (respectively), and thus sample different sets of synaptic inputs during neural circuit development. In the current study, I provide evidence that the dendrites of facial motor neurons do exhibit dorsoventral topography that matches the topography of their cell bodies. These results are consistent with the hypothesis that facial motor neurons acquire specific synaptic inputs in a location-dependent manner, based on the relative dorsoventral position of their

dendrites. Future studies will directly test this hypothesis, by interfering with dorsoventral topography and testing the impact on facial motor neuron activity and respiratory behavior.

P82 - RADIO JOVE DETECTION OF IONOSPHERIC DIMMING DURING THE OCTOBER 2023 ANNULAR ECLIPSE

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ABSTRACT

The ionosphere is a region of charged particles in the atmosphere critical to maintaining life on earth and acting as a mirror for terrestrial radio transmissions such as HF radio, GPS, and satellite communications. Composed of three layers, the ionosphere is in a constant state of flux as the sun charges the D layer each day, and each night the D layer becomes thin and nearly disappears. Solar eclipses offer a unique opportunity to study ionospheric dynamics since a reduction in solar radiation is expected to reduce the density and thickness of the ionosphere. Here, we use NASA's Radio JOVE antenna to detect changes in the ionosphere during the annular eclipse on October 14, 2023. Radio JOVE records low-frequency (16-24 MHz) signals from a copper dipole, and it is principally used in citizen science projects investigating the Sun, Jupiter, and the galactic background. During the eclipse, we were positioned near the midline near Sonora, Texas, and experienced 4 minutes 57 seconds of annularity. We show that during the eclipse, broadband low-frequency signals decreased, consistent with a dimming in the ionosphere. These results indicate that when the ionosphere is blocked from solar radiation, charged particles decrease, and the atmosphere becomes more transparent rather than reflective, similar to what occurs naturally at night. By understanding how minor fluctuations in solar exposure impact this area of the atmosphere, we are better able to develop measures to defend our global telecommunications networks against solar flares and disruptions in the electromagnetic spectrum.

P83 - THE EFFECT OF VOLTAGE BETWEEN THE SYRINGE NEEDLE AND THE COLLECTOR ON THE TENSILE TESTING MECHANICAL PROPERTIES FOR ELECTROSPUN POLYCAPROLACTONE FIBERS

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ABSTRACT

This study investigates the impact of voltage applied between the syringe needle and the collector on the tensile properties of electrospun polycaprolactone (PCL) fibers. We performed tensile tests on PCL fibers using a loading rate of 5 mm/min. We conducted a total of six sets of tests, with the first set consisting of 36 samples made from a PCL solution flowing at a rate of 1 mL/min. The second set also had 36 samples made from a PCL solution flowing at a rate of 2 mL/min. In both sets, the voltage between the syringe needle and the collector was maintained at 14 kV, resulting in 72 samples. The samples from each set are categorized into six groups, with weight concentrations of 5% to 18%, whereas the solvent used is acetone. The average Young's modulus for the first set was 3.9 ± 0.7 MPa. For the second set, the Young's modulus was 3.2 ± 0.8 MPa. We conducted the identical analysis on the samples made out of two different voltages, 17 kV and 20 kV. The samples produced with a PCL solution flow rate of 1 mL/min exhibited a 10% rise in Young's modulus at 17 kV and a 12% rise at 20 kV, compared to 14 kV. The Young's modulus increased by 5% and 7% when the voltage was set at 17 kV and 20 kV, respectively, for samples prepared from a PCL solution that had a flow rate of 2 mL/min and a voltage of 14 kV.

P84 - DIGITAL IMAGE CORRELATION BASED FATIGUE STRAIN MAPPING STUDY ON A 3D PRINTED PART WITH A LOW-COST FATIGUE MACHINE

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ABSTRACT

Using an eccentric cam profile, a Formlab Elastic 50A resin-made 3D printed block was subjected to cyclic compressive loads at 1 Hz. The testing process lasted for six hours and involved capturing a total of four images at 30-minute intervals during the first two hours, six images at 20-minute intervals during the third and fourth hour, 12 images at 5-minute intervals during the fifth hour, and 30 images at 2-minute intervals during the sixth hour. The cam profile is designed to make a one-eighth of an inch deflection of the 3D-printed block for each cycle smoothly, using a low-cost fatigue testing machine. After analyzing all those images using the digital image correlation (DIC), we will explore the effect of cyclic fatigue on the 3D printed blocks. We

anticipate that there will be no permanent deformation of that 3D printed block, but the strain mapping will start taking a more concave shape at the point of contact point after a couple of hours of operation, indicating strain hardening underneath the 3D printed top surface.

P85 - ROBOTIC ARM STUDY TO SIMULATE HUMAN KNEE JOINT KINEMATICS ON AN ELASTIC MATERIAL

AUTHORS

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ABSTRACT

The Anterior Cruciate Ligament (ACL) is an intricate bundle of tissues located in the knee joint of humans. One of the internal factors that increases the risk of ACL injury is the tibial eminence, which refers to the protruding top section of the tibia bone. Effectively assessing the impact of tibial prominence on ACL straining from a bio mechanical standpoint is challenging. Utilizing the inverse kinematics, a Baxter robot, equipped with two robotic arms, provides support and simulates the movement of an elastic foam. Here, the elastic foam is being used instead of the human knee joint to facilitate the conceptual study. The Baxter robot's robotic arms move two ends of an elastic material, assuming that one end is the tibia, and the other end is the femur of a human knee joint. Both robotic arms will interact to apply tension, compression, and twisting forces on an elastic foam material. A Differential Variable Reluctance Transducer will interpret the elastic foam straining generated in each motion. The entire project is under investigation to assess the specific requirements of a new prospective robot, such as the design of the fixture, the required speed of the robotic arm, and the necessary force to be exerted on the knee joint to emulate authentic sporting kinematic data.

P86 - A MOLECULAR DYNAMICS STUDY: THE STUDY OF CUT-OFF DISTANCE BETWEEN TWO DIFFERENT ATOMS FOR DIFFERENT LENNARD-JONES POTENTIAL

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ABSTRACT

Gel polymers compromise between liquid electrolytes and solid-state electrolytes, incorporating certain benefits from both. A comprehensive simulation is necessary to forecast the electrochemical performance of gel polymers, particularly the interplay between electrolytes and electrodes. The Lennard-Jones (LJ) model helps comprehend the underlying interactions between electrolytes and the electrode surface. This study explores the interaction between lithium salt and the zinc atom. The polyethylene oxide matrix electrolyte contains lithium salt, and the electrode comprises zinc atoms. The simulation model consists of a Lennard-Jones fluid composed of two distinct types of atoms confined within a cubic box that employs periodic boundary conditions (PBC), and the inclusion of PBC confirms the characterization of bulk materials without resorting to computationally extensive simulations of exceedingly large systems. A Langevin thermostat is used to control the temperature of the system. We are determining the cutoff distance between lithium and zinc atom by employing three distinct Lennard-Jones potentials, specifically LJ 9,6, LJ 12,4, and LJ 12,6.

P87 - AUTONOMOUS PARALLEL PARKING USING REINFORCEMENT LEARNING

AUTHORS

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ABSTRACT

Self-driving vehicles have slowly become mainstream as the technology of autonomous systems continue to advance. Regardless of the type of parking, the act of driving a car will always require parking at the end of the drive. Parallel parking is an important form of parking that is needed in major metropolitan cities in the United States, and even required for some driving tests as it requires the most skill. However, autonomous parallel parking is still being developed and perfected; with research currently being pursued in several different types of controls. This presentation will discuss the use of Reinforcement Learning (RL) to autonomously parallel park Quanser's Qcar using the MATLAB Programming Language and Simulink Real-Time Blocks. Through the use of MATLAB and Simulink, a successful reinforcement learning controller will be demonstrated on the Qcar using the Quanser QUARC Real-Time Control Software. Initial testing was performed virtually through simulation. Using MATLAB and Simulink RL Agent block, the AI agent successfully was able to parallel park autonomously. The training for the agent to successfully complete the task took several weeks in which each individual training session lasted several hours. Several problems were encountered during the first few training sessions as expected,

but in the end, the agent was able to correct itself and properly parallel park. The use of reinforcement learning for this problem is optimal as it relates it more to the application of it in a full-size vehicle.

P88 - DNA BARCODING USED TO IDENTIFY PANICUM SPP. COLLECTED IN GUADALUPE COUNTY, TEXAS.

AUTHORS

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ABSTRACT

Belonging to Poaceae, Panicum (panic grass) is a large genus with around 500 individual species found worldwide. Identification of Panicum specimens based on morphology remains difficult since dichotomous keys focus on features of reproductive parts. For this study, 16 vouchers were stored in the TLU Herbarium, and each voucher consisted of specimens collected on the Weston Ranch in Guadalupe County, Texas. Originally, 11 samples were identified as P. coloratum, 1 was P. capillarioides, 1 was P. dichotomiflorum, and 3 samples were only identified to the genus level, Panicum. To aid in identification, DNA barcoding was utilized. DNA barcoding involves the amplification of a region of DNA that is different for each species. For each voucher, DNA was extracted, and two barcodes were amplified with PCR. The barcodes were nuclear internal transcribed spacer 2 (ITS2) and chloroplast NADH dehydrogenase F (ndhF). Following Sanger sequencing, DNA sequences for each sample were aligned and grouped using Unipro UGENE software. Out of the original 11 samples identified as P. coloratum, 10 were 100% similar for both barcodes, and were also consistent based on morphology. Identifications of vouchers, Lara 74 and Hight 286, were changed to P. hallii and P. virgatum, respectively. Sagstetter 2 and Patterson 4 were 100% similar to each other, but their identification was unclear. Johnson 164 and Villegas 47 were originally identified as Panicum, but after analysis the two vouchers were identified as Urochloa. These final four specimens will need further investigation to be identified to the species level.

P89 - INHIBITION OF ALBUMIN DENATURIZATION BY EPHEDRA ASPERA AND EPHEDRA ANTISYPHILITICA

AUTHORS

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ABSTRACT

In many cultures, natural plant compounds have been used to inhibit inflammatory pathways for centuries with limited side effects. Two native species found in the western U.S. is Ephedra aspera and Ephedra antisyphilitica. These plants were used by indigenous people to treat kidney failure, venereal disease and pneumonia in America. Ephedras have been traditionally used to treat allergies, breathing disorders, asthma, colds, coughs and fever. The plant specimens used were from El Paso, Texas and Ojinaja, Chihuahua Mexico. The objective of this study was to analyze the anti-inflammatory property of Ephedra extracts using egg albumin denaturation assay. The effect of the Ephedra extract was compared to ibuprofen, a known anti-inflammatory in the test. Serial dilutions were used to create concentrations from 1000microg/mL to 0.1microg/mL for the Ephedra and ibuprofen extracts. The extracts were then combined with egg albumin in a phosphate buffer. The combined extracts were then heated to 37°C for 15 minutes and then 50°C for 5 minutes in an incubator, and then cooled for fifteen minutes. The absorbance at 660nm was measured. The absorbance for heated extract and unheated extract samples were compared against each other. The protein denaturization was calculated. All tests were run three times with the Ephedra and ibuprofen extracts. Preliminary results show inhibition of denaturization at 26.5% at 1000µg/mL and 5.4% at 0.1µg/mL with ibuprofen; 28.8% at 1000µg/mL and 22.7% at 0.1µg/mL with Ephedra aspera.

P90 - GENE FLOW AMONG POPULATIONS OF THE ANNUAL WILDFLOWER MENTZELIA PECTINATA (LOASACEAE).

AUTHORS

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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). In order to

investigate the genetic relationship between these two taxa, 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 17 individuals each for two populations (B740 and B744) of Mentzelia pectinata var. chrysopetala. Allele sizes ranged from 136 to 175 base-pairs and both populations contained 30–40% heterozygous individuals. Fst was 0.218, suggesting substantial genetic difference and that populations even within the same variety are not connected by high gene flow in M. pectinata.

P91 - CAN SEEDS FROM DIFFERENT GENERATIONS OF MOUSE EAR THALE CRESS (ARABIDOPSIS THALIANA) GERMINATE AFTER STAYING DORMANT FOR 7 YEARS AND COMPLETE AN ENTIRE LIFECYCLE TO PRODUCE OFFSPRING?

AUTHORS

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ABSTRACT

Seed longevity depends on the seeds themselves as well as on the storage conditions. Arabidopsis thaliana, hereafter Arabidopsis, is an annual plant species that produces thousands of seeds within a generation. Intraspecific hybridization or admixture refers to the remixing of divergent genomes from different parts of an organism range. In Arabidopsis, admixed genotypes can be created through flower emasculations. There is no clear evidence on the length of time that seeds can remain viable in Arabidopsis and moreover, the potential effect of hybridization on seed longevity. This study investigates the germination rates and life cycle completion of Arabidopsis seeds (hybrids and their parents) after seven years of storage. Although the prolonged dormancy period challenges the germination rates across our genotypes, the germination rate was near 1% in parents and 5% in hybrids, once the seeds germinated, seedlings were able to successfully develop into mature plants completing their life cycle. Understanding seed mechanisms enables resilience. The hybrids exhibited earlier germination and faster bolting than their parental counterparts. Additionally, they yielded a greater quantity of fruits and attained greater seed production. The case of Arabidopsis germination highlights the species' remarkable adaptive strategies. Understanding the mechanisms behind this prolonged dormancy and successful germination can contribute valuable insights into plant biology and have implications for crop management and conservation efforts.

P92 - HAPLOTYPE DIVERSITY AMONG POPULATIONS REPRESENTING SEPARATE VARIETIES OF MENTZELIA PECTINATA (LOASACEAE).

AUTHORS

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ABSTRACT

Mentzelia pectinata (San Joaquin blazingstar) is an annual wildflower endemic to the southern margins of California's Central Valley. Previous studies have suggested that M. pectinata has a mixed mating system and intermediate levels of cpDNA haplotype diversity with respect to other members of Mentzelia section Trachyphytum. Mentzelia pectinata was recently divided into a yellow-flowered variety, M. pectinata variety chrysopetala, found along the western edge of the species distribution and an orange-flowered variety, M. pectinata variety pectinata, in the central and eastern portions of the range. We have performed increased sampling for genetic variation in M. pectinata at the inter- and intra-populational levels in order to investigate the relationship between morphological and molecular genetic variation. We sequenced the ndhF–rpl32 cpDNA spacer for 7–18 individuals from 6 populations extending across the range of the species and at least one individual for 14 additional populations. A single ancestral haplotype occurred throughout the geographic range and was found in most populations. However, derived haplotypes displayed geographic clustering, and both flower color varieties exhibited at least one individual bearing an introgressed haplotype from the eastern desert species, M. nitens (shining blazingstar). Surprisingly, two geographically distant populations of M. pectinata variety chrysopetala shared a rare derived haplotype, suggesting that flower color could be correlated with selectively neutral genetic variation in cpDNA.

P93 - MOLECULAR IDENTIFICATION USING DNA BARCODING OF BOTHRIOCHLOA SPECIMENS COLLECTED FROM GUADALUPE COUNTY.

AUTHORS

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ABSTRACT

The genus Bothriochloa has 34 species of grasses that are difficult to identify based only on morphology since many features used to distinguish between different species of Bothriochloa have significant overlap with each other. DNA barcoding is a method to compare regions of DNA of a specimen to the same region of a different specimen. To identify 15 specimens of 3 different species more accurately within this genus, DNA barcoding was used as a supplementary form of identification. All the specimens were collected from Guadalupe County and all, but two specimens were collected from the Weston Ranch. Two barcodes were selected for this study. Internal transcribed spacer 2 (ITS2) was used on all specimens and maturase K (matK) was used on a representative specimen from each group identified using ITS2. DNA was extracted, amplified using PCR, sequenced using Sanger sequencing, and analyzed using UGENE. After comparing sequences, plants were placed in groups based on sequence similarities. The DNA sequences for ITS2 showed four groups that likely represented 4 different species. Of the 15 specimens 7 were reclassified based on genetic evidence. Eight specimens were identified as Bothriochloa laguroides, 4 as Dichanthium sericeum, 2 as Bothriochloa ischaemum. One specimen, Gates 132, did not group with other specimens based on barcodes and was identified as Bothriochloa ischaemum based on morphology. This study has shown that ITS2 was a good barcode for distinguishing species within the Bothriochloa genus. The DNA barcode matK worked only as a supportive barcode to ITS2.

P94 - COMPARATIVE ANALYSIS OF THE EFFECT OF NUTRIENTS IN LOLIUM MULTIFLORUM

AUTHORS

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ABSTRACT

Lolium multiflorum (hereafter Lolium) is an herbaceous annual, biennial, or perennial angiosperm, known as Italian ryegrass or westerworld ryegrass, that can grow up to 0.6–1.0 m in height. Lolium is genetically diverse and is highly adaptable to its environment. It is a rapidly growing plant that can invade natural grasslands or other plant communities into which it has been introduced, causing frequent disturbance. It reduces the species richness and diversity of natural grasslands. This study investigates the effects of nutrients in the vegetative development of Lolium in a controlled environment. Plants of Lolium were grown for three months under a 16:8 h day:night regime. Plants were supplied with water (control treatment) or with a 7% NPK solution (nutrient treatment). We found that nutrients have a significant effect in traits such as number of tills, shoot/root length as well as number of blades. Overall, plants that were treated with nutrients grew significantly more tills as well as a faster growth rate when compared to their counterparts. Also, we found more phenotypic variation across all measured traits when plants were growing with nutrients. The outcomes of this research hold important ramifications for growing Lolium in diverse habitats.

P95 - COMPARATIVE ANALYSIS OF ARABIDOPSIS THALIANA FROM VARIOUS REGIONS UNDER DROUGHT CONDITIONS: EVIDENCE OF PHENOTYPIC PLASTICITY

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ABSTRACT

Arabidopsis thaliana is a widely used angiosperm that exhibits genetic diversity across several geographical regions, which include Germany, Portugal, Spain, Italy, the United States of America, France, and Poland. Phenotypic plasticity is the ability of a genotype to produce different phenotypes in response to the environment. Plasticity could be a mechanism that explains the broad distribution range of Arabidopsis. This study investigates the phenotypic plasticity of different genotypes of Arabidopsis from five geographic origins in response to drought conditions. Plants were grown under control and drought conditions (plants received water once per week vs once every two weeks). Here, we show phenotypic and physiological differences among these genotypes when exposed to limited water availability. We found that drought significantly reduced bolting times, number of leaves after bolting, number of fruits, and heights across all genotypes. Genotypes from Germany showed the least affected phenotype in response to drought. Our results demonstrate unique responses to drought stress among Arabidopsis genotypes, with variations in rosette bolting diameter and number of fruits. The outcomes of this research hold noteworthy results for understanding plant phenotypic plasticity to water scarcity and could contribute to the development of more plastic crop varieties.

P96 - EXPLORING THE ANTIBACTERIAL POTENTIAL OF NATIVE EPHEDRA SPECIES IN THE PERMIAN BASIN

AUTHORS

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ABSTRACT

This project aims to investigate the antibacterial properties of the native species Ephedra in the Permian Basin, specifically Ephedra aspera and Ephedra antisyphilitica. Using the UTPB Edwin B. Kurtz Herbarium, TORCH, INaturalist, and social media, Ephedra locations were pinpointed locally. With historical uses in Mexican culture for treating asthma and infection, Ephedra, or "Mormon Tea," is of interest. The study focuses on two species of Ephedra, testing them against Klebsiella aerogenes, Escherichia coli, Pseudomonas aeruginosa, and Enterococcus faecalis. The extraction process includes drying and powdering the plant, followed by extraction using a mixture of ethanol and methanol. The resulting solution is applied to the Ephedra disk and placed on nutrient agar with bacteria lawns. The zone of clearance is measured to determine antibacterial efficacy. Unlike Chinese Ephedra, the native species contain trace amounts of pseudoephedrine, avoiding regulatory concerns associated with ephedrine. This research aims to identify a natural remedy with high efficacy and low toxicity, contributing to the search for alternative antibacterial agents.

P97 - SOIL WATER SATURATION AFFECTS PHOTOSYNTHETIC CHARACTERISTICS OF RICE

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ABSTRACT

Rice is a water-intensive crop due to the use of flooding as a means of weed control and its sensitivity to drought conditions. Incipient water shortages in the primary rice-producing regions of the US threaten rice production. Growing conventional rice cultivars using less water would be beneficial, so we investigated how current cultivars bred to maximize yield in flooded field conditions responded to reduced water saturation of the soil. We compared gas exchange measures of rice plants grown in fully water-saturated soils with those of plants grown in soils allowed to drain after daily watering for a commercial hybrid and an herbicide-resistant variety. We found that the level of soil water saturation a rice plant is grown in can affect its photosynthetic performance when mature. Stomatal conductance of mature specimens varied according to both variety and water treatment. The herbicide-resistant variety exhibited reduced stomatal conductance when grown with drainage. It also showed greater stomatal conductance when grown under soil saturation than the regular hybrid. Our results suggest that currently farmed rice cultivars may be sensitive to reduction of flooding as a weed-control technique even if weed competition is controlled by other means. These metabolic effects of soil saturation may affect plant biomass and yield.

P98 - ECOJEDI SUMMER RESEARCH PROGRAM EXPERIENCES AT OUR LADY OF THE LAKE UNIVERSITY (OLLU) 2023

AUTHORS

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ABSTRACT

As part of EcoJEDI Cohort I, OLLU students took part in fieldtrips, guest speaker engagements, participated in workshops, and gained research experience. Students developed communication and writing skills for academic and professional careers. These experiences served to bridge the gap between theoretical knowledge gained in the classroom and practical application in professional settings. As part of the summer research component, OLLU students were paired with researchers from research-intensive universities or organizations to gain experiences not available at OLLU. One student traveled to Asheville, NC for a summer internship with the U.S. Forestry Service at Bent Creek Experimental Forest performing vegetation surveys to measure responses to gap-based forest management. A second student worked at the University of Texas at San Antonio (UTSA) under Dr. Vikram Kapoor and investigated microbiologically induced corrosion of the (70/30) Copper-nickel alloy in marine vessels and structures. A third student worked under Dr. Jeffrey Hutchinson at UTSA collecting samples from Leon Creek Greenway measuring the presence of microplastics in biofilm, the effects of microplastics on tadpoles, and the composition of organic material near ephemeral pools. Student takeaways from the program include (1) "remaining patient when conducting research and to not fear getting out of your comfort zone", (2) "I felt as an underrepresented individual this program helped me find my passion through experience", and (3) "my summer experience as an EcoJEDI not only equipped me with a comprehensive skill set, but also forged meaningful connections and opened my eyes to new career pathways".

P99 - DEVELOPING MICRO-CREDENTIALING CRITERIA FOR HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

AUTHORS

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ABSTRACT

Micro-credentialing has become more popular over the past few years. In the Department of Chemistry and Biochemistry at Stephen F. Austin State University (SFASU), micro-credentialing is being explored as a way to give students concrete, marketable skills that will further their education. We define micro-credentialing as a teaching/learning strategy that uses detailed student instructions over a specific task, followed by student practice, then a test of the student's competence with the task. High Performance Liquid Chromatography (HPLC) is a chromatographic technique that utilizes sophisticated and complex instrumentation to separate non-volatile mixtures. In this work, we showcase the development of a detailed set of instructions for students using the HPLC. These instructions will be utilized in micro-credentialing future SFASU students with the HPLC.

P100 - SOCIAL VULNERABILITY INDEX & MOSQUITO PREVALENCE IN HARRIS COUNTY TEXAS: AEDES AEGYPTI VS AEDES ALBOPICTUS

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ABSTRACT

The prevalence of mosquito diseases are amongst us. Harris County has become a main focused in creating suitable habitats for mosquitoes. There are many types of mosquitoes located in Harris County. To determine this, there are traps located all around Harris County. Mosquito types are then compared to social vulnerability index to determine if there has been a correlation to type of mosquito and rating of SVI over a ten-year period. 2012 has been excluded from the research because there are no 2012 SVI found through the CDC website. The results indicated that there were a higher female count of Aedes aegypti and Aedes albopictus indicated in the high rating of SVI versus areas that were depicted to have a lower SVI. These traps are necessary to help determine the relationship of mosquito type/ disease to vulnerable areas.

P101 - UNCOVERING OVERLAPPING MECHANISMS BETWEEN DIFFERENT LOCOMOTION BEHAVIORS IN TWO DROSOPHILA SPECIES

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ABSTRACT

Animal behaviors in the natural environment are vital for their survival. As these behaviors were constantly selected by their environment, genetic loci accumulate in favor of select behavior outcomes. Two sister Drosophila species, D. simulans and D. sechellia, which are found in different geographic regions, prefer different food sources. D. simulans, found across continents, feed on a variety of food whereas D. sechellia has evolved to consume the toxic fruit of Morinda citrifolia on an island. When these two species were cultured in the lab, they displayed different levels of exploration behaviors, presumably due to whether there is need to forage large vs refined geological areas. However, it is sometimes difficult to differentiate whether this difference resides in their motivation to explore a new environment or the basic locomotion mechanisms. To investigate this possibility, we characterized the locomotive profiles of D. simulans, D. sechellia and their interspecies lines using the negative geotaxis and Drosophila activity monitor assay. Furthermore, we did correlation analysis of their exploration with those two locomotive phenotypes to uncover any possible overlapping mechanisms. Our results showed the two species and their interspecies lines differed in their negative geotaxis performance and 24-hour locomotion, but not necessarily in correlation with exploration. Interestingly, we found sex differences in some, but not all the phenotypes. All these observations suggested the complexity of genetics in locomotion related behaviors and importance of using multiple behavior assays in the lab.

P102 - A WALK THROUGH GEOLOGIC TIME: CREATING INTEREST IN EARTH SCIENCES USING AN ARCHIVAL WEBSITE FOR THE SFA ROCK GARDEN

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ABSTRACT

Quick Response (QR) codes can be used on public nature walks to identify flora and fauna, and provide important details about resources and public safety. Signage with QR codes is becoming more common, and many people own a smartphone with the capability of scanning these codes. Over many years, professors have been collecting large rock specimens that have been deposited at the west entrance of the Miller Science Building on the SFASU Campus. Up until this point, no signage has been put in place to identify any of these rocks to passers-by. Many people are unaware of its existence due to a lack of any indicators or signage.

During summer 2023, ten rock specimens from the SFA Rock Garden were identified and described, and small plaques with QR codes were installed next to the specimens. These codes lead to a webpage which allows campus visitors and interested students, faculty, and staff to quickly and easily access facts about individual rocks and key geological concepts. The SFA Rock Garden can be used to educate current and potential college students, K-12 STEM students, and provide interactive displays for alumni and the general public. Over the next year, additional signage will be installed to expand the website and increase interest in the Department of Earth Sciences and Geologic Resources.

P103 - THRIVING UNDER PRESSURE: A COMPARATIVE STUDY OF BACILLUS SUBTILIS STRAINS IN VARYING SALT AND TEMPERATURE CONDITIONS

AUTHORS
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ABSTRACT
Bacillus subtilis is a gram-positive, rod-shaped, endospore-forming bacterium naturally found in soil environments, an ecosystem that undergoes constant abiotic stress. To survive under hostile conditions, B. subtilis is known for being able to develop different survival strategies and be highly adaptable to different conditions, including high salt concentrations and temperatures. This study had the objective of analyzing the growth trends of four Bacillus subtilis strains (1-386, 2-206, A-233, B-167), that have been cultivated since 2000 under standard conditions, by exposure to varying salt concentrations (between 2% and 13%) and temperature conditions (between 42ºC and 60ºC) to estimate their tolerance for both variables, observe fundamental evolutionary differences between the four strains and compare to a wild B. subtilis type. The strains were inoculated in broths prepared with different salt concentrations and incubated at 37ºC for one experiment, while inoculated in nutrient broth and incubated at varying temperatures for the other experiment. By measuring their optical density (OD) values after the incubation period and analyzing their average values, it was possible to conclude that each strain developed a unique behavior under the same conditions, a result from years of isolation and evolutionary behavior. Similarly, they all differ when compared to the wild type B. subtilis. The limit values for the strains (growth nearly or equal zero OD) were concentrations between 11% and 13% NaCl and temperature range between 55ºC to 57ºC. In addition, the strains were visualized under a phase-contrast microscope for morphological observations, presenting clear differences in shape and length.

P104 - ASSESSMENT OF SYMBIOSIS BETWEEN PHYLLANTHUS (PHYLLANTHACEAE) AND EPICEPHALA (LEPIDOPTERA: GRACILLARIIDAE) IN THE CARIBBEAN

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ABSTRACT
Brood pollination is a specialized insect-plant relationship where insects pollinate but also lay eggs in their host plant's flowers. Examples include yuccas and yucca moths, figs and fig wasps, and leafflowers and leafflower moths. Leafflowers are globally distributed, however, their interactions with leafflower moths in Asia have received more attention than the ones in Latin America. This research will focus on the three species of leafflower (Phyllanthus) in Puerto Rico and their associated leafflower moths (Epicephala), in order to determine the ecology of their relationships. Dissections of fruit from Phyllanthus cuneifolius and P. epiphyllanthus were done and seed damage made by Epicephala moths was found in both species. For both plants, seed damage varied between only a subset of seeds or all seeds being consumed. These results may thus be consistent with either a mutualistic or parasitic relationship in these two species pairs. To determine whether this interaction is mutualistic or parasitic, diurnal and nocturnal observations will be conducted to observe the behavior of leafflower moths on the plants. Fruit will be collected and moth larvae will be reared out individually to measure seed damage caused by individual larvae. Larvae will be reared to adults to examine morphological features, such as the presence or lack of hairs on the proboscis, that are associated with pollination and parasitic behavior in Epicephala in Asia. Finally, DNA will be extracted from the moths to construct a phylogenetic tree to assess the evolutionary relationships of these Caribbean moths with Epicephala elsewhere in the world.

P105 - MOLECULAR PHYLOGENETIC ANALYSIS OF THE BEAKED CAVESNAIL (PHREATODROBIA ROTUNDA) & UNDERSTANDING POSSIBLE CONVERGENT EVOLUTION OF SHELL SHAPE

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ABSTRACT
The Edwards Aquifer system is one of the most ecologically diverse ground water systems in the world, containing multiple poorly known species of freshwater snails. The imperiled (S2) snail Phreatodrobia rotunda, is 1 of 4 species within Phreatodrobia that has evolved a flat shell shape dissimilar to its tall-shelled relatives. Convergent evolution of shell shape is a common phenomenon for gastropods and can cause confusion for systematic and taxonomic studies. Our main objective is to understand flat shell shape convergence within the phreatic species and gain insight on the inter and intrapopulation genetic variation of P. rotunda; this information is crucial for effective research and conservation of freshwater mollusks. For this study we extracted DNA from a population of P. rotunda in Comal Springs using mitochondrial cytochrome oxidase 1 and nuclear large subunit genes, we sequenced, aligned, and combined this data with sequences from Genbank. The preliminary results indicate that P. rotunda is genetically distinct from other phreatic species, is most closely related to tall shelled

relative P. spica with 12.0 % genetic distance and has 14.4 % genetic distance from its nearest flat shelled relative P. micra. In the future we would like to understand the interpopulation variation (gene flow) of P. rotunda from Fessenden Springs and further clarify the phreatic/freshwater snail phylogeny.

P106 - INVESTIGATING MORPHOLOGICALLY DISPARATE POPULATIONS OF THE DOMED CAVESNAIL

AUTHORS

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ABSTRACT

The identification of freshwater snails previously used shell morphology. However, new technologies have increased the accuracy of identifying different species. Analyzing DNA has helped expand our understanding of freshwater snails, a species that's not well known but common in the diverse ecosystem of the Edwards Aquifer system. Phreatodrobia nugax is one such freshwater snail species that is incredibly morphologically diverse within itself and often used as a "trashcan" group to place individuals that aren't easily classified. The goal of this study was to analyze the differences in DNA for P. nugax across different sites. This is important since it'll allow for a better understanding of the freshwater snail and how it may have diverged after living isolated from other individuals of the same species. For this study, the DNA of P. nugax from three separate river drainages (Honey Creek in Comal County, San Marcos River in Hays County, and Old Mill Springs in Travis County) were extracted and processed for mitochondrial cytochrome oxidase 1 (CO1) and nuclear large subunit (LSU) data. Then, sequences downloaded from GenBank were used to compare the P. nugax extracted to other Phreatodrobia species and examined with a phylogenetic tree. Upon analyzing our data, P. nugax from Hays and Travis County vary slightly (suggesting a close relationship) while the P. nugax in Comal County varies significantly (significant enough to suggest a different species). Our next step would be to analyze individuals from more populations across the range of "P. nugax" to see what patterns emerge.

P107 - PHREATODROBIA CORONAE (MOLLUSCA: GASTROPODA) IS THE IMPOSTER OF THE GENUS

AUTHORS

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ABSTRACT

Phreatodrobia coronae is a freshwater snail species that was described in 1987 from the Devil's River in Val Verde County, Texas. It belongs to the genus Phreatodrobia, which comprises ten species that inhabit subterranean waters in the Edwards Aquifer system. Previous studies have suggested that P. coronae is morphologically similar to P. imitata and P. nugax, but there is no molecular evidence to support this hypothesis. The aim of this study was to determine the phylogenetic relationship of P. coronae to the other Phreatodrobia species using DNA data. Understanding phylogenetic relationships can assist with understanding species' biology. We extracted DNA from a population of P. coronae from Slaughter bend springs, the type locality, using the Qiagen DNeasy Blood and Tissue Kit, amplified and sequenced two genes: mitochondrial cytochrome oxidase 1 (CO1) and nuclear large subunit (LSU). We aligned and assembled the sequences using Geneious and compared them with Genbank sequences of the other Phreatodrobia species and some outgroups. The results showed that P. coronae is not closely related to P. imitata or P. nugax, but rather is in a clade with other members of the Cochliopidae, not Phreatodrobia. The next phase of this study will involve dissecting and examining the anatomy of P. coronae specimens to confirm this finding along with DNA extractions.

P108 - TAXONOMIC ANALYSIS OF SPRINGSNAILS OF PYRGULOPSIS LOCATED IN NEVADA

AUTHORS

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ABSTRACT

The freshwater spring snail genus Pyrgulopsis is widespread, diverse, and abundant in the western United States. A proposed species-level clade was found in Ruby Lake NWR in northeastern Nevada. Several close relatives of the proposed clade are located in Nevada (P. serrata, P. marcida, P. sterilis) and Utah (P.plicata, P. inopinata). A taxonomic analysis of the Ruby Lake populations and close relatives is required to determine if those species should remain as sister species or combined to a single species. Mitochondria molecular data analysis found that the p-distance between the Ruby Lake population and all the related species was 96-98% when comparing the aligned DNA to each other. Typical interspecific distance in Pyrgulopsis is ~4% indicating perhaps some of these species are synonyms. Comparison of radula, reproductive organs, as well as mitochondrial and nuclear DNA will be used to determine how many species are present.

P109 - PHYLOGENETIC RELATIONSHIPS OF THE HIGH-HAT CAVESNAIL PHREATODROBIA PUNCTATA (MOLLUSCA: GASTROPODA)

AUTHORS
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ABSTRACT
Phreatodrobia punctata, the “high-hat cavesnail”, is a freshwater mollusk that has been evaluated as imperiled in Texas due to a narrow range and human usage of regional groundwater. The phylogenetic placement of P. punctata is unknown with no DNA data available for this species. I examined P. punctata from the hyporheic zone of the San Marcos River at Scull Crossing in Hays County, Texas. Using PCR, I successfully amplified and sequenced the mitochondrial cytochrome oxidase 1 and nuclear large subunit genes. After the specimens were sequenced and incorporated with data available in Genbank, a phylogenetic tree was constructed. I found that P. punctata’s mitochondrial tree closest relative is Phreatodrobia rotunda while the nuclear DNA did not distinguish between Phreatodrobia nugax and Phreatodrobia plana as P. punctata’s closest relative. The nuclear DNA data has less resolution at the species level. It is currently unknown as to why the mitochondrial and nuclear DNA appear to conflict; therefore, we will continue to work on these invertebrates to assist in conserving this phreatic snail species before they become at a greater risk for extinction.

P110 - INTERSPECIFIC DIVERSITY WITHIN THE GENUS THOMASOMYS (RODENTIA: CRICETIDAE) IN ECUADOR.

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ABSTRACT
Thomasomys (Oldfield mice) is a genus of cricetid rodents in the subfamily Sigmodontinae that currently includes 48 species. The genus is endemic to the tropical Andes at elevations from 1150 to 4600 meters, primarily occurring in montane forests. Many new species of Thomasomys have been recently discovered, and further work to delineate phylogenetic clades and species boundaries is needed to facilitate revision of the genus as a whole. As part of these efforts, teams from Abilene Christian University have collaborated with Ecuadorian scientists for nearly 20 years to survey the species of Ecuador, resulting in the confirmation of at least 15 Ecuadorian taxa. In this study we incorporate new samples from three taxa collected in 2023 and use phylogeny reconstruction of all existing samples to assess the most pressing needs for taxonomic revision. Based on sequences from the mitochondrial cytochrome c oxidase I gene (CO1), a collection of T. auriculans grouped, as expected, sister to a clade of other large-bodied species containing T. aureus and T. burneoi. New putative collections of T. caudivarius from Cerro de Arcos were not similar to previously sampled populations and were placed in a phylogenetically unresolved position relative to T. caudivarius and T. salazari. In contrast, new collections of T. taczanowskii were placed in a well-resolved subclade of T. taczanowskii sensu lato. Together with the sister taxon T. baeops, T. baeops and T. taczanowskii comprise a clade containing at least five phylogenetically distinct subclades that should be investigated for under-recognized interspecific diversity.

P111 - COLUMELLA MORPHOLOGY IN MISSISSIPPI KITES (ICTINIA MISSISSIPPIENSIS)

AUTHORS
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ABSTRACT
Birds, like reptiles and amphibians, have a single middle ear ossicle known as the columella. The columella acts to transmit vibrations from the tympanum and cartilaginous extracolumella tissue to the fluid of the inner ear. Morphological studies of the avian columella are few and primarily have examined variation among species. To date, fewer have explored morphological variation within a single species. This research aims to examine variation of the columella of Mississippi kites (Ictinia mississippiensis), an intermediate-sized raptor, by comparing columella from adults of both sexes. With the aid of microscopy and computer software, measured morphologies include maximum Ferret’s diameter of the footplate, footplate perimeter, and columella length. No significant differences in columella morphology were observed between male and female Mississippi kites. Although there was no significant variation between the sexes, understanding the variation of this important, but often overlooked, component of the avian skeleton will add to our understanding of avian evolution and adaptation.

P112 - MICROBIOME VARIATION ACROSS THE MUTUALISM-PARASITISM TRANSITION IN LEAFFLOWER MOTHS LEPIDOPTERA: GRACILLARIIDAE: EPICEPHALA

AUTHORS

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ABSTRACT

This study focuses on a recently discovered specialized pollination association between leafflower plants (Phyllanthaceae: Phyllantheae) and their pollinating leafflower moths (Lepidoptera: Gracillariidae: Epicephala). Most species of leafflower moth exclusively pollinate specific plant lineages, engaging in pollination while depositing eggs in the flowers' ovaries, resulting in caterpillars feeding on developing seeds. Notably, this mutualism has transitioned into parasitism seven times, more frequently than in other mutualisms. These parasitic moths adopt strategies such as galling host flowers or consuming all seeds without pollination. Our research investigates how interactions with bacterial microbiomes vary across the mutualism-parasitism transition and shifts among host plant lineages. Specifically, it examines microbiome diversity within populations of an undescribed Epicephala species associated with smartweed leafflower (Nellica polygonoides), prevalent in Texas and Oklahoma. Moth caterpillars were collected from different sites in Texas, targeting specific ecoregions. Sample collection has been completed, and next bacterial DNA will be extracted, and diagnostic regions (16S rRNA) amplified and sequenced through PCR and MySeq (Illumina), respectively. Using QIIME against the SILVA database, taxa will be identified to operational taxonomic units (OTUs), analyzing bacterial community diversity with principal coordinate analysis (PCA) and analysis of similarity (ANOSIM). The results, once obtained, will serve as a reference dataset, aiding future among-species comparisons within the lab and providing insights into mutualistic breakdowns and microbiome dynamics in leafflower moths.

P113 - UNDERSTANDING THE DISTRIBUTION OF THE SMOOTH SOFTSHELL (APALONE MUTICA) IN THE CANADIAN RIVER THROUGH TRADITIONAL AND NOVEL SURVEY METHODS

AUTHORS

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ABSTRACT

The Smooth Softshell (Apalone mutica) is a cryptic aquatic turtle species that inhabits rivers and streams throughout central North America. In New Mexico, the Canadian River provides important habitat for this species, but little is known about its distribution and abundance in this area. To gain a better understanding of this species in New Mexico, this research aimed to combine traditional and novel methods to survey for the Smooth Softshell in the Canadian River drainage in New Mexico. Surveys were conducted during the spring and summer months when turtles are most active and detection rates are higher. The study utilized both traditional and novel survey methods. Traditional methods include visual surveys, which were conducted by walking along the riverbank and scanning for the presence of individuals through binoculars for 15 minutes, and hoop-net trapping, which allowed for additional information on individual health, sex, and body condition to be collected; novel survey methods for Smooth Sofshells consist of environmental DNA (eDNA) sampling. eDNA surveys are based off the collection of DNA shed by organisms into the water, which are then captured (filtered) and returned to the lab for DNA amplification and sequencing. The surveys were conducted at predetermined sites along the river; sites were selected based on factors such as accessibility, habitat suitability, and previous reports and observations of Smooth Softshells. We hope the combination of traditional and novel surveys methods improve the detection of Smooth Softshells and that information generated helps to inform management decisions.

P114 - RESTORATION OF A SPRING RUN SILTED IN BY A DAM ALONG HONEYCUT SPRINGS, C.L. BROWNING RANCH, JOHNSON CITY, TEXAS

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ABSTRACT

Honeycut Springs is a spring-fed stream at C.L. Browning Ranch in Johnson City, Texas. A small concrete dam 250 meters from the spring head resulted in silt > 1 m deep that became dominated by torpedograss (Panicum repens), an invasive aquatic grass. The largest area of torpedograss (167 m^3) was removed by dredging during June 2018. Restoration of native riparian, aquatic, and terrestrial plants was initiated in 2018 and 2019. Riparian plantings included Emory's sedge, Texas rush, tussock spikerush, knotgrass, and American water willow. Aquatic plants used in the restoration effort included creeping primrose willow, Illinois pondweed, water hyssop, water pennywort, water stargrass, and delta arrowhead. In the adjacent upland site disturbed during dredging, five native grasses were planted that included: Texas cupgrass, silver bluestem, switchgrass, eastern gamagrass, and inland woodoats. This presentation will discuss the current status of the restoration effort based on the success of native and spontaneous vegetation plant establishment through 2023.

P115 - SEASONAL PATTERNS OF ALLOCHTHONOUS SOURCES OF ENERGY INTO EPHEMERAL POOLS IN LEON CREEK GREENWAY, SAN ANTONIO, TEXAS.

AUTHORS

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ABSTRACT

The terrestrial import of organic matter represents the primary carbon and energy source that drives the food web to the upper reach of perennial and ephemeral streams. Leon Creek is an ephemeral stream in northern San Antonio, Texas that flows periodically following a heavy precipitation event. Leon Creek experiences infrequent flooding, contraction, and isolation of pools of various sizes within the stream. Many of these pools dry out within 4 weeks to 6 months. This cycle is repeated but often over irregular periods. Limited information exists on the organic matter input into the ephemeral pools in Leon Creek. These isolated pools within the creek represent some of the only aquatic systems in the area and have a high diversity of invertebrates, amphibians, and reptiles. As part of an on-going study, organic matter was sampled along the edges of 12 ephemeral pools to estimate the type of potential organic matter input into the pools. Three samples of organic matter were collected from 0.25 m^2 plots in the fall and winter of 2022, and spring and summer of 2023. All organic matter was sorted by plant species or type in the lab, bagged and labeled, and dried for biomass. Following drying, three 5-gram replicates of each organic matter type were burned at 550 °C for 4 hours to estimate percent organic matter and carbon. The results for the seasonal sample periods are currently being analyzed and the 1-year results from the study will be presented at the conference.

P116 - ISOLATING AND IDENTIFYING ANTIBIOTIC-PRODUCING BACTERIA FROM TLU SOIL SAMPLES

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ABSTRACT

Novel antibiotic-producing bacteria can be found anywhere, including Texas Lutheran University. Soil samples from the Steger Hall South Apartment as well as the underground tunnel in the Moody basement were collected, diluted, and spread plated. Colonies were differentiated and a master plate was made in order to screen the colonies for antibiotic activity against Escherichia coli, a gram negative bacterial strain, and Staphylococcus epidermidis, a gram positive bacterial strain. Those that exhibited a zone of inhibition were gram stained and screened further. Identification of these colonies was done using polymerase chain reaction (PCR) tests and shotgun cloning was attempted.

P117 - DIURNAL ROOST SITES AND FOREST STRUCTURE AND COMPOSITION USED BY PORCUPINES IN THE UPPER LEON CREEK GREENWAY, SAN ANTONIO, TEXAS.

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ABSTRACT

The North American porcupine (Erethizon dorsatum) reaches its eastern range in Central Texas but is expanding its range east and south. The porcupine uses caves, crevices, and trees for roost and den sites, but limited information is known on its use of trees in south-central Texas. In the fall of 2022 through the spring of 2023, porcupines (n = 6) were observed during the daytime resting in five large live oak trees along Leon Creek Greenway in northern San Antonio. The porcupines were discovered by one of the authors walking their dog when the dog became aggressive and led the owner to the trees with the porcupine where they were spotted in the canopy on large limbs or the main bole. The area containing all the porcupines observed was an oak mott with infrequently large live oaks and mostly smaller cedar elm, sugarberry, and Texas persimmon. All trees were located within 150 m of a permanent 0.06 ha water source that formed in a flood-scoured depression. This presentation will describe the tree characteristics of the trees used by the porcupines and the structure and composition of the surrounding forest habitat near the eastern edge of their range.

P118 - STABILITY OF VIRGINIA OPOSSUM (DIDELPHIS VIRGINIANA) POPULATION IN AN URBAN SYSTEM DURING A 9-YEAR PERIOD.

AUTHORS

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ABSTRACT

From 15 Oct 2014 to 30 Nov 2023 abundance of Virginia opossums (Didelphis virginiana) was obtained using motion-sensor-trail-cameras located randomly in an urban forested area of the East Texas Baptist University's Environmental Studies Area. The study site is located within the city limits of Marshall, TX. The objective of our study is to examine the stability of numbers of Virginia opossums in an urban system. Monthly numbers of pictures adjusted for number of cameras (RAI) fluctuated greatly through the 9 years of the study (RAI: 0 - 22.8). There are no monthly or seasonal correlations to temperature or precipitation. However, the three warmest years had the greatest RAI. There are no correlations with domestic dogs (Canis lupus familiaris; r = -0.0127; P = 0.6051) or a competitor, raccoons (Procyon lotor; r = -0.0078; P = 0.7504). Preliminary analysis indicates a lack of stability in numbers of Virginia opossums. Further analysis will be required to determine a possible causal effect.

P119 - SHIFTING ACTIVITY OF RACCOONS (PROCYON LOTOR) IN AN URBAN SYSTEM IN RESPONSE TO COVID

AUTHORS

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ABSTRACT

From 15 Oct 2014 to 30 Nov 2023 activity of raccoons (Procyon lotor) was obtained using motion-sensor-trail-cameras located randomly in an urban forested area of the East Texas Baptist University's Environmental Studies Area. The study site is located within the city limits of Marshall, TX. The objective of this study was to investigate a shift in raccoon activity starting in June 2020 to more diurnal activity. Activity significantly shifted ($t_{69.545}$ = -4.037; P= 0.0001) to a greater diurnal activity after June 2020 (mean 0.167 ± 0.122) from a mean 0.0746 ± 0.104 diurnal prior to June 2020. Composites for the years shifted significantly ($t_{4.12}$ = -5.746, P = 0.0042) after 2020 (mean = 0.131 ± 0.267) from (mean = 0.047 ± 0.014) prior to 2020. We hypothesize that the initial shift may have been due to lessened human activity during the initial period of COVID and remained high following that time. Pictures with multiple individuals increased after June 2020 indicating the sustained shift may be due to a learned response of the young following their mother.

P120 - A TEST OF PREDATOR ODOR RECOGNITION IN RURAL AND URBAN CAROLINA WRENS

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ABSTRACT

Recent studies have suggested some songbirds are able to detect predator odors. Carolina Wrens (Thryothorus ludovicianus) are resident, cavity-nesting songbirds of the eastern United States. We set out to determine if Carolina wrens recognize predator odors and if wrens in a rural area (Pineywoods Environmental Research Lab, PERL) are more likely to respond to raccoon (Procyon lotor) odors than wrens nesting in an urban area (City of Huntsville). We predicted that if Carolina wrens possess the ability to detect predator odors, they would exhibit avoidance or hesitation to enter their nest box more so in the presence of a predator odor than to control odors. We treated active nests with an odor applied to filter paper while parents were away and then filmed the parental response when they returned to their nests. We conducted trials at the incubation stage. Each nest was tested with raccoon urine on one day and a randomly assigned control consisting of either orange oil, liquid garlic extract or purified water on another day. In both habitats, the wrens did not show more hesitation to the predator odor than any of the controls. Either wrens did not detect the predator odor or they did not recognize it as a threat. We are continuing to collect data to increase our sample sizes and investigating other ways to test our hypothesis for predator odor recognition in wrens.

P121 - ULTRAVIOLET REFLECTANCE OF LICHENS INCORPORATED INTO RUBY-THROATED HUMMINGBIRD NESTS

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ABSTRACT

Female ruby-throated hummingbirds (Archilochus colubris) incorporate lichens into the outer surface of their nests, which makes the nests more cryptic, decreasing the likelihood of nest predation. Like many flowers, some lichens reflect wavelengths of ultraviolet (UV) light (i.e., light with wavelengths of 100-400 nm, outside of the range visible to humans). Some birds, including hummingbirds, as well as a variety of potential nest predators, can see light in portions of the UV spectrum. In this study, we investigated whether ruby-throated hummingbirds utilize UV-reflecting lichens when constructing their nests. We used a UV-LED light and mirrorless camera with a UV-passing filter to measure UV reflectance of nest lichens (from 320 to 380 nm, which includes UV wavelengths visible to hummingbirds). We present values of UV reflectance from nests collected in 2023 and older nests in an existing museum collection. UV reflectance of nest materials may be an important aspect of nest crypsis in some birds.

P122 - TREE SPATIAL STRUCTURE IN A MIXED CONIFER FOREST IN THE SACRAMENTO MOUNTAINS OF SOUTH-CENTRAL NEW MEXICO

AUTHORS

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ABSTRACT

The spatial pattern of trees in forests can be an important driver of tree mortality and recruitment and may reflect both historical disturbances and inter- and intraspecific interactions amongst tree species. In this study we describe the spatial relationships of trees in a mixed conifer forest in the Sacramento Mountains of south-central New Mexico. We mapped the coordinate locations of all trees within a 30x40m plot. We tagged every standing tree in the plot and recorded diameter, mortality status, and species identity. There are 234 trees in the plot, 157 living and 77 standing dead. The plot was dominated by Douglas fir (Pseudotsuga menziesii; 136 trees) and southern white pine (Pinus strobiformis; 63 trees). We used pair correlation functions and the o-ring statistic to test null hypotheses of complete spatial randomness of trees in the plot. Univariate analysis of all living trees indicated clumping of trees within scales of 3m. Bivariate random-labelling analysis found living and dead trees were spatially random with respect to each other. Similarly, bivariate toroidal shift analysis also found that Douglas fir and southern white pine trees were spatially random with respect to each other. Clumping within scales of 3m may reflect patterns of tree establishment within forest openings, either from dead and downed trees or a legacy effect of logging within the plot. Future work will focus on expanding the size of the plot and continuing to monitor tree growth and spatial pattern within the site in the coming years.

P123 - SONG DIALECTS OF THE MOUNTAIN CHICKADEE (POECILE GAMBELI) IN THE SKY ISLANDS OF WESTERN TEXAS AND NEW MEXICO

AUTHORS

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ABSTRACT

For many species of passerine bird, young males acquire their song during a sensitive period when they learn songs from their paternal parents or nearby neighbors. Since young birds are most likely to learn their songs from nearby singers, regional song dialects may form, particularly in non-migratory birds residing in isolated habitat patches. Mountain chickadees (Poecile gambeli) in the ranges of Trans Pecos Texas and southeastern New Mexico are an excellent subject to study this phenomenon due to their isolation on forested mountain peaks and resident status. Samples from 65 Mountain chickadees recorded in 2023 in the Sacramento and White Mountains, Gallinas Mountains, and Manzano Mountains exhibit differences in the predominant song types and repertoires across each mountain range. Chickadees in the Sacramento, White, and Gallinas Mountains deliver songs consisting of three long notes, while those in the Manzano Mountains deliver songs with two brief notes followed by two long notes. Using percentage similarity, repertoires of chickadees in the Gallinas Mountains were 65% similar to those in the Sacramento and White Mountains. Chickadee repertoires in the Manzano Mountains were 18% and 12% similar to the Gallinas Mountains and the Sacramento and White Mountains, respectively. These differences in song repertoires likely reflect the isolation between populations of chickadees inhabiting these sky islands in southeast New Mexico. Forthcoming analyses will examine song similarity versus geographic distances between chickadees and relationships between song diversity and habitat patch size. More songs will be sampled from Davis and Guadalupe Mountains in the upcoming spring season.

P124 - SUPERWORMS ARE INDEED SUPER! AN INITIAL EXAMINATION OF A BEETLE'S DIETARY USE OF POLYSTYRENE

AUTHORS

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ABSTRACT

Superworms [(Coleoptera: Tenebrionidae, Zophobas morio (F.1776)] are a game changer when it comes to decomposing polystyrene products. Polystyrene is a plastic product commonly known as “Styrofoam™”. It can be in the form of a hard plastic polymer known as extruded polystyrene (XPS) or a soft, light foam material known as expanded polystyrene (EPS). EPS is used widely in the food storage and service industry and is a major environmental hazard because of production processes and massive solid waste problems due to large scale single use products. Superworm larvae can digest polystyrene due to enzymes produced by their gut microbiota. I set up a Superworm ecosystem to observe the feeding behavior and digestion products of this beetle’s use of EPS. Both the larvae and adult beetles were observed feeding on the EPS. No developmental ill-effects were noticed in the life cycle of the beetles over a 2-year period. I subjected soil created from fecal matter produced by the larvae and adults to gas chromatograph mass spectrometry and found no indications of harmful substances in the soil. A 2-year feeding trial using a predatory Crested Gecko did not show any ill-effects on feeding or its apparent health. Additionally, the Superworm beetles and larvae were seen feeding on a rubber eraser indicating they may be able to digest synthetic rubber polymers. These results suggest the Superworm may provide some relief in the polystyrene waste stream, thereby living up to its name!

P125 - QUANTIFICATION OF ENVIRONMENTAL DNA (EDNA) SHEDDING BY THE TERRESTRIAL LIZARD SCELOPORUS CONSOBRINUS USING A CTAB-CHLOROFORM DNA EXTRACTION METHOD

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ABSTRACT

Factors such as habitat loss, invasive species, and emerging diseases have caused 20% of contemporary global reptile species to face the risk of extinction. Building species habitat maps, as well as other activities to effectively manage reptile populations, require accurate and sensitive species detection methods. The collection and identification of genetic materials shed by organisms into their environment in the form of sloughed cells, feces, and other wastes, referred to as environmental DNA (eDNA) analysis, has emerged as a sensitive, rapid, and affordable tool for species detection. Although eDNA methods are commonly applied in aquatic habitats, terrestrial systems remain less explored. We considered the prairie lizard Sceloporus consobrinus as a model organism to quantify eDNA shedding by terrestrial lizards. In a laboratory experiment, we housed individual lizards in small enclosures under controlled environmental conditions for 1, 6, 12, or 24 hours, then we collected all sand substrate within the enclosure and applied a CTAB-chloroform method to extract eDNA. We used species-specific quantitative polymerase chain reaction to measure target eDNA in each sample. Overall, sand samples collected from an environment with longer lizard exposure tended to contain more lizard eDNA, but when we compared shedding rates in our experiment with data generated using two alternative DNA extraction methods (see other posters in this session), we found that extraction methodology can affect eDNA results. Based on our results, we suggest that eDNA detection provides a promising method for terrestrial reptile study, management, and conservation.

P126 - QUANTIFICATION OF ENVIRONMENTAL DNA (EDNA) SHEDDING BY THE TERRESTRIAL LIZARD SCELOPORUS CONSOBRINUS USING A QIAGEN POWER SOIL DNA EXTRACTION METHOD

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ABSTRACT

Globally, around 20% of reptile species are at risk of extinction due to factors such as habitat loss, invasive species, and emerging diseases. Accurate and sensitive species detection methods are critical to effectively manage reptile populations and are the foundation for building species habitat maps. Environmental DNA (eDNA) analysis, the collection and identification of genetic materials shed by organisms into their environment in the form of sloughed cells, feces, and other wastes, has emerged as a tool for rapid species detection with high sensitivity and often lower cost than traditional methods. Although eDNA methods have been developed extensively in aquatic systems, some taxa, such as terrestrial reptiles, remain relatively unexplored. We used the prairie lizard Sceloporus consobrinus as a model organism to quantify eDNA shedding by

terrestrial lizards. We incubated individual lizards under controlled laboratory conditions in small enclosures for 1, 6, 12, or 24 hours. We then collected all sand substrate within the enclosure and used a QIAGEN Power Soil DNA extraction method to isolate DNA. We applied species-specific quantitative polymerase chain reaction (qPCR) to quantify S. consobrinus eDNA in each sample. In general, sand samples collected from an environment with longer lizard exposure contained more eDNA. Further, we compared shedding rates in our experiment with data generated using two alternative DNA extraction methods (see other posters in this session) to see how methodology affects eDNA results. Our results demonstrate that eDNA detection represents a promising method for study, management, and conservation of terrestrial reptiles.

P127 - QUANTIFICATION OF ENVIRONMENTAL DNA (EDNA) SHEDDING BY THE TERRESTRIAL LIZARD SCELOPORUS CONSOBRINUS USING A MACHEREY-NAGEL NUCLEOSPIN DNA EXTRACTION METHOD

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ABSTRACT

Nearly 20% of all reptile species are threatened with extinction due to stressors that include emerging disease, invasive species, and habitat loss. Therefore, sensitive and accurate detection methods are needed to enable effective management with tools such as distribution and habitat modeling. Environmental DNA (eDNA) analysis, the collection and genetic identification of materials shed by organisms into their environment including sloughed cells and feces, has emerged as a tool for rapid species detection, often exceeding the sensitivity and costing less than traditional methods. Despite the fact that eDNA methods have been extensively applied to research and management in aquatic environments, their application in terrestrial habitats has been relatively limited. We quantified eDNA shedding by terrestrial lizards, focusing on the prairie lizard Sceloporus consobrinus as a model organism. Under controlled laboratory conditions, we incubated individual lizards in small enclosures for 1, 6, 12, or 24 hours. We then collected all sand substrates within the enclosure and used a phosphate buffer and Macherey-Nagel NucleoSpin extraction method to isolate DNA followed by species-specific quantitative polymerase chain reaction (qPCR) to quantify S. consobrinus eDNA. Broadly, we observed that eDNA concentration related positively to lizard exposure time. Finally, we compared shedding rates in our experiment with data from parallel experiments that applied two alternative DNA extraction methods (see other posters in this session) to examine whether methodology affects eDNA results. Our study demonstrates that eDNA detection represents a promising method for study, management, and conservation of terrestrial reptiles.

P128 - QUANTIFYING MICROINVERTEBRATE SPECIES IN SOIL SAMPLES TO DETERMINE THEIR SPECIFIC IMPACT ON SOIL HEALTH AND PLANT ABUNDANCE

AUTHORS

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ABSTRACT

Soil invertebrates play important roles in maintaining soil health by facilitating processes like photosynthesis and decomposition while also providing food for predators. When healthy soil is present, more plants are able to grow, showing that the presence of soil invertebrates indirectly impacts plant abundance. Microinvertebrates of the mesofauna and macrofauna groups include creatures like springtails, bristletails, and ticks that can be extracted from soil and viewed under a stereoscope. While all these invertebrates have been shown to impact soil health and plant abundance as a whole, studies have not specifically shown which type – if any – has the biggest impact on these factors. Through a series of soil sample collections and microinvertebrate extractions in Central Texas, the different species will be quantified to reveal any possible correlations between a specific type of invertebrate and increased plant abundance. It is hypothesized that the invertebrates present at the highest numbers in a given area will have the greatest impact on soil health and plant abundance. The expected results include higher invertebrate diversity in areas with abundant plants and one or two invertebrates appearing at higher frequencies than the rest.

P129 - UNRAVELING A DECADE OF MOSQUITO SPECIES LOCALIZATION IN HARRIS COUNTY

AUTHORS

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ABSTRACT

This study focuses on the geospatial distribution patterns of vectors capable of disease-spreading, emphasizing four key organisms of significant public health concern within Harris County's diverse mosquito population comprised of over 70 species. Not all species possess vectorial capacity, thus highlighting the need for an investigation aimed at delineating changes in vector abundance and distribution. Leveraging advanced geospatial mapping techniques and data analytics, this research provides critical insights into the abundance and distribution of vector populations and temporal events. We hope to later investigate the dynamic interaction between environmental factors and vector populations. Our research project undertakes a comprehensive longitudinal assessment of endemic ectoparasite vectors in Harris County, Texas, which spans over a decade. By examining species within the genus' Aedes, Culex, and Anopheles, this study offers invaluable knowledge for the safeguarding of public health throughout the region. Through our newly acquired proficiency in Microsoft Excel and ESRI's ArcGIS software, we organized and analyzed data crucial in public health research. The efforts and results merge the practical skills gained through academic certification with the analysis of real-world phenomena, contributing to the development of targeted control strategies and enhancing our understanding of vectorial distribution.

ORAL ABSTRACTS

(alpha by title)

A METHOD FOR DETECTION OF PFA AND MICROPLASTICS IN SOME TEXAS WETLANDS

AUTHORS

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ABSTRACT

Perfluoroalkyl (PFA) compounds are now found in many terrestrial and aquatic ecosystems. Exposure to PFAs has been linked to cancer and many health problems. Microplastics can contain high levels of PFA and are now considered to be ubiquitous in the environment. Wetlands have been constructed in Texas to help naturally filter water from upstream sources of processed wastewater in rivers and feed the water into reservoirs for reuse. The water that flows through the wetland from river sources can contain PFAs, microplastics, and many other chemical contaminants. When the processed wastewater flows into wetlands, it can accumulate PFAs and microplastics in the wetland. Chemical detection of PFA at low levels has been limited to highly sensitive chemical instrumentation, making PFA measurements expensive and time-consuming. Microplastics are also difficult to quantify but can be rapidly identified using microscopic FTIR methods. This work plans to develop a simpler chemical method to detect PFAs and microplastics using standard lab instrumentation such as GCMS, HPLC, and microscopic FTIR and to use these methods to survey wetlands for the levels present in the water and soil samples.

A SURVEY OF ORTHOPEDIC MEDICAL DEVICES AND THE DEGREE OF OSSEOINTEGRATION IN A MODERN SKELETAL COLLECTION

AUTHORS

Theresa De Cree - United States - Texas State University
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ABSTRACT

In forensic anthropology the analysis of medical devices has been limited to the role of identification. Manufacturer serial numbers on medical devices can be used for the positive identification of remains via medical records. However, without a serial number the presence of the device has a limited impact during forensic anthropological analysis. In this research, the presence of skeletal surgical intervention was documented and analyzed for over 500 individuals in the Texas State Donated Skeletal Collection. Trends were analyzed for presence and absence of devices in age, sex and population affinity groups. When possible, device type, material, location, bony ingrowth and osseointegration was assessed for trends as well. This information will provide a basis for understanding the role of medical devices in forensic anthropology, pathology, and trauma analyses. This research serves as a basis for future investigations into the influence of medical devices on trauma and pathology analysis. Recognizing medical devices and understanding their function will aid in the interpretation of skeletal pathology and its influence on trauma. Recognizing device types and brands can support generalized time since death estimations. Interpreting bony ingrowth and osseointegration can aid in the understanding of bone biomechanics and therefore influence the interpretation of perimortem trauma on affected elements. Although, identification by medical device serial number is very important in forensic case work there is much more to be learned from the presence of these devices.

ADVANCING CLIMATE RESILIENCE THROUGH SUSTAINABLE HYDROGEN PRODUCTION IN SOUTH TEXAS

AUTHORS

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ABSTRACT

This effort aims to realize "clean energy and healthy life," which will be accomplished by incorporating robust non-platinum catalysts for water electrolysis and reactive electrocatalysts for the PEMFC stack. The catalyst costs will be collectively lowered through amphiphilic functionalization manufacturing, enabling kilogram scaleup to meet market demand. The optimized engineering design between hydrogen generation and fuel stack will result in high power performance with greater fuel economy in the "HFC-4L prototype vehicle". These innovations will enable HFC to be commercialized by lowering the break-even point. The technical and economic feasibility of the proposal is based on: **1)** decentralized production and onboard storage of hydrogen (H_2) fuel to avoid transportation costs and improve safe operation. **2)** The hydrogen fuel cells (HFCs) showed high power density, zero-carbon emission, and low platinum (Pt) loading; and **3)** The prototype model car showed an enhancement of mileage and velocity. The technical goal is reducing the capital cost for HFCs to < \$100 kW^{-1} with efficiencies of about 70 %, compared with costs of \$500/kWe for gas-turbine plants burning natural gas with efficiencies of about 50 %. This enables fuel cells to have a very large capacity to produce peak electrical power compared with the steady-state output of the reactor.

AEROSOLIZING MOLTEN SALT FOR QUANTITATIVE AND QUALITATIVE ANALYSIS

AUTHORS

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ABSTRACT

As advanced nuclear reactors are being researched to address growing energy needs, new methods for monitoring reactor status are crucial for their success. This is particularly true of molten salt reactors, which use heated, liquid salts as the heat transfer mechanism for sustaining nuclear reactions. Identifying corrosive elements found in molten salt loops is imperative for reactor sustainability and safety. Oxidative corrosion of the reactor loop by oxygen or fission product metals will lead to structural and chemical hazards. Additionally, any water present in the molten salt will yield hydrogen fluoride, an extremely toxic and corrosive acid. These issues must be addressed to safely operate the molten salt research reactor at Abilene Christian University funded by Natura Resources. Though techniques such as inductively coupled plasma-mass spectrometry and atomic absorption spectroscopy are commonly used for elemental analysis, the high salt content saturates detectors and can damage them. Aerosolizing methods such as Collison and piezoelectric nebulization allow for the quantification and identification of components in molten salt samples in real-time by aerosolizing salt into small particles. Generating a molten salt aerosol with an inert gas keeps samples from being exposed to the atmosphere, keeping oxygen and water from contaminating the samples. Data was collected using pre-mixed nitrate salt mixtures, a precursor to fluoride salt mixtures that will be analyzed in future work. Qualitative results for salt components Na, K, and Li were obtained using both spectrometry methods and other elements were tested with similar results.

ALGAE DIVERSITY IN EPHEMERAL POOLS ALONG THE UPPER SECTION OF LEON CREEK GREENWAY, SAN ANTONIO, TEXAS

AUTHORS

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ABSTRACT

Pools within ephemeral streams are isolated throughout the year except during high precipitation events when flow occurs and the pools become connected. Ephemeral streams and isolated pools that contain water for various periods have received minimal attention in Central Texas. Algae are major primary producers in freshwater systems. Algae, including cyanobacteria, were sampled over a 1.5 km stretch in 12 pools within the ephemeral stream in Leon Creek over 12 months at an approximate interval of every 2 weeks for a total of 31 sampling events. Samples were collected in the littoral zone at an average water depth of 20 cm. The pools were isolated and some pools were dry during sampling. Each sampling event, 50 ml water samples were collected at each pool from biofilm, floating filamentous algae, leaf litter, sediment, and the water column with a pipette. Basic water quality variables (temperature, pH, and conductivity) and present/absence of water were recorded at the time of sampling. Algae samples were analyzed within 48 hours of collection under a compound microscope at 10 or 40 x magnification. Algae were classified to lowest taxa using a gridded slide. Algae species richness, evenness, and diversity were evaluated seasonally and compared in relation to water level fluctuations. The results of the study will be presented at the conference.

ANALYSIS OF EAST TEXAS LANDFOWL AND WATERFOWL EGG SHELLS

AUTHORS

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ABSTRACT

Calcium carbonate naturally occurs and is a key component in animalia structural physiology, land egg laying amniotes, fossil deposits, pharmaceuticals, organic deposits in soil, and is the main chemical component in limestone. Calcium carbonate is theoretically found to make up ~95% of the chemical composition in chicken eggs with variations among different avian species, which translates to an approximate 40% Ca composition in eggshells in commercial chickens. Eggshell formation is dependent on carbonic anhydrase in the shell glands of egg-laying species and can be affected by environmental dietary factors. If the diet of the avian species contains contaminants, such as strontium or other heavy metals, the calcium can be displaced by the contaminant and cause malformations in eggshell structure. The contaminant can further leach into the albumen and yolk of the egg. This is harmful to any organism consuming the egg or the embryo developing in the egg. The egg shells of various East Texas landfowl and waterfowl are being analyzed to determine calcium, strontium, carbonate, carbon, nitrogen, and chloride composition of the shells. The shells are divided into the sharp and dull ends to determine if there is any difference in chemical composition. Analysis is done using LECO carbon nitrogen detection, STA, IR, and IC.

ANALYSIS OF HUMERAL ROBUSTICITY IN INDIVIDUALS WITH UNILATERAL SEPTAL APERTURES

AUTHORS

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ABSTRACT

Septal apertures (SA) are defects in the bony septum that separates the olecranon and coronoid fossae on the distal humerus. Previous research has found that their presence is highly variable between populations, occur in higher frequencies in females and on left humeri, and are significantly associated with the non-dominant hand. Several hypotheses have been proposed for their etiology with both support and lack of reported in the literature. Here, we test the robusticity hypothesis which postulates that more gracile humeri are more susceptible to SA development using 44 individuals (31 females – 13 males) with unilateral SA housed at the Texas State University Donated Skeletal Collection (TXSTDSC). Seven standard liner measurements were taken including humeral maximum length, midshaft maximum diameter, and five additional measures on both proximal and distal ends. Robusticity estimates were generated using the first two measures to calculate humeral robusticity ratios (HRI), while all measures were used to calculate geometric means (GM). Bilateral robusticity estimates were analyzed using paired-t and Wilcoxon signed-rank tests. These analyses recovered significant differences ($P < 0.05$) in GM between humeri with SA and their contralateral, while HRI comparisons were not significant (P 0.10-0.05). These results may indicate that estimates which incorporate more information than bivariate ratios better recover size differences between paired elements. Future research on SA will include calculating cross-sectional geometry estimates of robusticity using mCT data.

ANALYSIS OF PHYTOCHEMICALS IN WATERCRESS LEAVES

AUTHORS

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ABSTRACT

Watercress (WC), an aquatic plant popularly used in salads and soups, is the richest known natural source of gluconasturtiin, a precursor to the chemopreventive agent phenylethylisothiocyanate (PEITC). The antioxidative properties of watercress are due to the presence of polyphenols, flavonoids, and terpenoids in WC leaves. Our goal was to determine the optimal solvent for extraction and to identify extracted phytochemicals. Methanol, ethanol, ethyl acetate and water extracts were prepared from watercress leafy juice. HPLC analysis revealed that the methanol solution extracted the most phytochemicals compared to other extracts. Total flavonoid content, total antioxidant capacity , and total phenolic acid content were determined using various colorimetric methods. These biochemical assays indicated that the methanol extract contained more phytochemicals and greater antioxidant property than other extracts. Chemical structural analysis was conducted through attenuated total reflectance-Fourier transform IR (ATR-FTIR) spectroscopy. ATR-FTIR scans for each extract were collected and compared with the standards quercetin, gallic acid, and isothiocyanate. Lastly, we investigated the interaction between watercress extract and bovine serum albumin (BSA) using fluorescence spectroscopy. Albumin is the natural carrier of drugs in the physiological system, so its ability to bind to phytochemicals is essential. A fluorescence based binding analysis of the ethanolic extract (1% by volume) with BSA was conducted and compared with quercetin and gallic acid binding profiles. The results suggest watercress extract binds to BSA, indicated by the quenching in the fluorescence excitation and emission intensities of the BSA and watercress conjugate compared to BSA alone. Further studies are underway.

ASSESSING THE DIVERSITY OF FISHES ALONG THE TEXAS GULF COAST USING ENVIRONMENTAL DNA METABARCODING

AUTHORS

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ABSTRACT

Considering increased human activities such as tourism, pollution, and marine traffic in coastal communities worldwide, efficient and affordable survey methods are needed for assessing the richness of marine organism populations. We examined the use of one such emerging method, environmental DNA (eDNA) metabarcoding, for assessing coastal fishes in Texas. Our specific goal was to explore coastal fish species richness based on eDNA reads in filtered seawater samples. In total, we identified eDNA from 57 fish species among our coastal samples (N = 57), which accounts for roughly 24% of the native coastal Texas fishes listed by the Texas Parks and Wildlife Department and includes numerous species of ecological and economic importance. Additionally, we used linear regressions to analyze any potential relationships between the number of eDNA reads detected at each site and various environmental factors that were measured at sample collection: turbidity ($p = 0.469$), water volume filtered ($p = 0.869$), pH ($p = 0.784$), salinity ($p = 0.573$), dissolved oxygen ($p = 0.488$), and surface temperature ($p = 0.960$). We found that no significant relationships existed, leading us to conclude that the distribution of eDNA may then be more heavily influenced by biotic factors rather than environmental variables. Despite the existing data gaps in reference databases, here we conclude that eDNA metabarcoding has the potential to be a valuable tool for characterizing coastal Texas fish communities and identifying species richness differences between distinct sites.

ATOMIC FORCE MICROSCOPY OF AMYLOID-B PEPTIDE/KAEMPFEROL INTERACTIONS

AUTHORS
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ABSTRACT
In Alzheimer's disease, the cognitive faculties responsible for the processing, retention, and retrieval of information undergo a process of degeneration. While the precise etiology of this affliction remains unclear, multiple prospective causes and potential therapies have been found. Evidence strongly indicates that Alzheimer's disease pathogenesis may be therapeutically treated with Keampferol, a polyphenol antioxidant. Understanding the workings of the Amyloid-β Peptide/Kampferol interactions holds utmost significance for future research. Atomic Force Microscopy is employed for the purpose of visualizing the Amyloid-β Peptide/Kaempferol interactions.

BLENDING THE CULTURAL SPHERES OF SCIENCE AND ART

AUTHORS
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ABSTRACT
Art and science have coexisted throughout history. Although scientists and artists are both driven to observe and create, they often work in different cultural and academic spheres. We will discuss an interdisciplinary non-majors course offered at The University of Mary Hardin-Baylor which taught topics of climate change and species extinction with the goal of increasing student awareness of human and technological impacts on the Earth. During the class, students learned about the impact of global warming, species invasions, and habitat destruction and biodiversity. In addition, they investigated different materials and ecological systems while considering their own actions when making art. Students had the opportunity to explore a biological topic in depth, and create both artistic and scientific representations of that topic which they shared with their classmates.

CHANGES IN AVIAN COMMUNITY STRUCTURE FOLLOWING PRESCRIBED THINNING OF PINYON-JUNIPER WOODLANDS IN NEW MEXICO

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ABSTRACT
Pinyon-juniper woodlands are a vital vegetation community for ecosystem health and biodiversity throughout the western United States. However, woodland stand characteristics have been impacted by historical grazing practices, fire suppression, and climate change, facilitating woody encroachment into landscapes that were predominantly open grassland savannas. In response, large-scale thinning and prescribed burning efforts are underway to restore stand densities and patterns while reducing hazardous fuel loads. However, these efforts must consider potential impacts to both pinyon-juniper obligate and grassland-nesting birds. To develop a better scientific understanding of how avian communities change following common woodland thinning approaches, we have partnered with the US Fish and Wildlife Service and Bureau of Land Management to conduct a long-term avian monitoring study in Lincoln County, New Mexico. We stratified random sampling across gradients of thinning intensities and utilized detection probability survey methods during 2018-2023 to assess changes over time in woodland bird communities associated with specific thinning treatments. This ongoing collaboration aims to provide key insights into species-specific and ecological community responses to woodland thinning. Ultimately, this research will provide data to facilitate informed policies and management decisions focused on balancing ecological restoration of pinyon-juniper ecosystems with avian conservation priorities on public forest lands.

CHARACTERIZATION OF A PARKINSON'S DISEASE-LIKE LOSS OF DOPAMINERGIC NEURONS IN 6-OHDA EXPOSED ZEBRAFISH LARVAE

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ABSTRACT
Parkinson's Disease (PD) is a neurodegenerative disorder that is clinically assessed by motor symptoms associated with the loss of midbrain dopaminergic neuron (DA) affecting the quality of life for over 8.5 million people worldwide. The neurotoxin 6-hydroxydopamine (6-OHDA) has been used to chemically induce a PD-like state in zebrafish larvae by several laboratories; however, highly variable concentration, methodology, and reagents have resulted in conflicting results regarding the efficacy

of 6-OHDA to model PD-like DA loss. We propose a robust protocol that induces a PD-like DA loss in 6 dpf larvae utilizing a 24 hour exposure at 3dpf with 30 μM 6-OHDA. Despite approximately 50 % lethality, no morphological or developmental differences in surviving fish are observed. Our model demonstrates downregulation of expression of th1 by qRT-PCR, a marker for dopaminergic neurons and a reduction in movement. Additionally, we observed a downregulation of pink1 and an upregulation of sod1 and sod2, indicating a state of mitochondrial dysfunction and a cellular response to reactive oxygen species respectively; both of which etiologically contribute to a Parkinsonian state.

COEVOLUTION OF A PREDOMINANTLY TROPICAL INSECT-PLANT SYMBIOSIS AT ITS NORTHERN RANGE MARGIN IN TEXAS

AUTHORS

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ABSTRACT

Associations between leafflower plants (Phyllanthaceae) and leafflower moths (Lepidoptera: Gracillariidae: Epicephala) are widely distributed in tropical and subtropical regions worldwide. Most species of leafflower moths actively pollinate the flowers of their host leafflower plants and then lay eggs in the flowers so their larvae can feed on the developing seeds. Thus the life cycles of both organisms are dependent on each other. In a few parts of the world, including Texas and the southeastern United States, these associations have evolved into temperate climates, offering a window into how tropical organisms—and tropical species interactions—evolve into the temperate zones. Here I provide an overview of recent research and findings in my lab on the evolution and ecology of this specialized plant-insect symbiosis in Texas. About eight years ago, I discovered that undescribed species of leafflower moths are found in Texas in association with two native leafflower plants (Phyllanthus evanescens and Nellica polygonoides). Ecological data indicates that these moths are parasites that do not pollinate their host plants, and phylogenetic analyses indicate that these moths represent two independent losses of pollination and are each closely related to other parasites elsewhere in the world. Ongoing survey efforts in the lab have revealed the distributions of these two undescribed leafflower moths in Texas. I conclude by presenting ongoing research on the pollination biology of native leafflowers in Texas, including the enigmatic sand-dune species Moeroris arenarius.

COLLECTION AND ANALYSIS OF SOIL ENVIRONMENTAL DNA FOR THE DETECTION OF THE TEXAS KANGAROO RAT DIPODOMYS ELATOR

AUTHORS

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ABSTRACT

The Texas kangaroo rat Dipodomys elator is listed as “Threatened” by Texas Parks and Wildlife and proposed to be listed as “Endangered” by the US Fish and Wildlife Service, therefore warranting careful monitoring and management. However, subpopulations of the species are characterized by low abundance and geographic dynamism, possibly existing within a complex metapopulation, so traditional survey methods such as camera and live trapping have thus far struggled to reveal a comprehensive understanding of the species distribution. Environmental DNA (eDNA) analysis, the collection and identification of genetic material that organisms shed into their environment in the form of sloughed cells and other wastes, may provide a powerful new tool for D. elator detection. We tested if eDNA extracted from soil can be used to detect D. elator. We designed a probe-based qPCR assay and confirmed specificity against tissue-derived DNA samples from D. elator and the three most closely related congenerics (D. phillipsii, D. merriami, and D. ordii). Next, we applied our assay to the analysis of eDNA in soil samples collected 0m, 5m, and 10m from known D. elator burrow entrances. Overall, we believe that this innovative method will enable rapid and sensitive detection of D. elator, which will in turn further our understanding of D. elator distribution and promote effective management.

COMPOSITION AND ANALYSIS OF MAYA POTTERY SHERDS FROM GUATEMALA

AUTHORS

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ABSTRACT

Pottery sherds were collected from two sites located in Guatemala (Zacpeten, and Tayasal). These sherds were used by the Maya people of lowland Guatemala. Powder X-ray fluorescence (p-XRF), Fourier transform infrared spectroscopy (FT-IR,) gas chromatography-flame ionization detector (GC-FID), gas chromatography-mass spectrometry (GC-MS), scanning electron microscopy (SEM) and energy dispersive x-ray spectroscopy (EDX) were used for spectroscopic and chromatographic analyses. P-XRF revealed presence of macroelements (Ca, K, Al, P, Si, Cl, S, Mg) and microelements (Mn, Nd, Pr, Ba, Zn, Mo, Sr, U, Rb, Th, Pb, Au, Se, As, Hg, Zr, W, Cu, Ni, Co, Ce, La, Sb, Sn, Cd, Ag, Y, Nb, Bi, Cr, V, Ti, Sc). The elemental findings from Zacpeten and Tayasal were compared to each other to reveal their similarities. Toxic elements found within the samples, such as Hg, Cd, and As, were below USEPA-recommended amounts. FTIR revealed aliphatic ν(C-H), carbonyl ν(C=O), and hydroxyl ν(O-H) functional groups. These functional groups give insight into the structure of lipids present in the matrix of the sherds. Lipid extraction was performed on sherds using an acidified methanol technique to isolate the total lipid extract (TLE). The TLE was analyzed through GC-FID and GC-MS. Analysis through various spectroscopic and chromatographic techniques revealed similarities in the lipid structures contained in the pottery sherds. It is hypothesized that medium-chained fatty acids will be most prevalent in the pottery sherds analyzed.

CONVERGENCE OF CHEMISTRY KNOWLEDGE AND MUSICAL APPROACH: A NEW TOOL TO IMPROVE STUDENTS' LEARNING OUTCOMES

AUTHORS

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ABSTRACT

The project aims to design and develop novel methods to converge chemistry core-knowledge into the musical domain. This "edutainment" (education and entertainment) approach aims to expand the emotional intelligence to all students of varying sophistication of chemical knowledge, to recognize when they needed help and to provide help in a manner consistent with their lifestyle. Through this proposed effort, the student and faculty team will revise the published chemistry songs and/or compose different musical lyrics and notations to improve knowledge retention and critical thinking skills towards entering the workforce. This 14-week study will take place in four chemistry classrooms at TAMUK, with a total of 300 students from low-socioeconomic Hispanic populations. Researchers will divide the students into treatment groups and control groups. Students in the treatment groups will receive specialized training in strategies using Chemistry SongBag, while the control group will be taught the same content in a whole-class, textbook-centered, teacher-directed format. The professor's standard assessment will be used to measure outcomes, and the data collected will be analyzed using analysis of variance to explore any differences among the groups.

COUMARIN-ENAMINE DOUBLE-ESIPT FLUORESCENT PROBES FOR MULTI-ANALYTES DETECTION

AUTHORS

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ABSTRACT

A series of Coumarin-enamine derivatives molecular probes have been synthesized that show optical response via UV-vis (naked eye detection) and fluorescence spectroscopy when bound to multiple anions (CH_3COO^-, F^-, CN^-, PO_4^{3-} ions). Two molecular probes have been synthesized in three steps; enamine-moiety tethered with hydroxycoumarin allows to form a new six membered ring system through Resonance Assisted Hydrogen Bonding (RAHB) that extends conjugation thus enhancing fluorescence via excited sate intramolecular proton transfer (ESIPT) fluorescence mechanism. Their photophysical properties have been studied in different solvent systems. Two broad absorptions band at 388nm and 475nm and emission at 550nm in DMSO. Upon the addition of the anions (CH_3COO^-, F^-, CN^-, PO_4^{3-}, Cl^-, Br^-, I^-, NO_3^-, HSO_4^-, SCN^-), anions abstract proton from the new ring system (RAHB) and generate optical response. However, only CH_3COO^-, F^-, CN^-, PO_4^{3-} shows response in both UV-vis and fluorescent. Absorbance band shifted from 388nm to 360nm for CH_3COO^-, F^-, PO_4^{3-} and 333nm for CN^- ions; emission band shifted from 550nm to 460nm for CH_3COO^-, F^-, PO_4^{3-} and 356nm for CN^- ions. Cyanide ions produced distinct absorption and emission band than other anions due to Michael-addition to enamine moiety whereas CH_3COO^-, F^-, PO_4^{3-} undergoes proton-deprotonation mechanism that form a new tetrahedral ligand suitable to bind with moderately soft metals based on Hard Soft Acid Based (HSAB) theory.

CREATING A HYDROGEL THAT MIMICS THE PHYSICAL AND CHEMICAL CHARACTERISTICS OF THE EXTRACELLULAR MATRIX (ECM) OF BRAIN PARENCHYMA.

AUTHORS

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ABSTRACT

Macromolecular therapeutics have shown promise in treating neurological disease; nevertheless, these treatments have been limited by the selectivity of the blood-brain barrier (BBB). Studying BBB interactions in the lab has required the use of in vivo models or the fabrication of brain organoids, which are both 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 extracellular matrix (ECM) of brain parenchyma. Creating these scaffolds will allow for a more accessible way of studying the delivery of neurotherapeutics through the BBB. In our lab we synthesized hydrogels from PLGA nanoparticles, gelatin methacryloyl (GelMA), and methacrylated hyaluronic acid (HAMA); the scaffolds were printed on an Allevi 1 bioprinter. We found that the addition of PLGA nanoparticles did not have a statistically significant impact on filament uniformity or filament fusion, indicating that nanoparticle addition did not reduce the printability of the original GelMA-HAMA hydrogel. A design of experiments (DOE) indicated that several factors and their combinations, including needle length, pressure, speed, and temperature/material, were statistically significant; indicating the different parameters that create a viable pore. Compression and swelling tests were also conducted to provide information on the bioinks' final mechanical properties and to compare them to those of human brain tissue. We plan on employing this in a BBB model with glioblastoma cells to begin evaluating the therapeutic potential of the system.

CSI: AUTOMATED CROSS-DOMAIN SHOEPRINT IDENTIFICATION USING DEEP LEARNING

AUTHORS

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ABSTRACT

Shoeprints, akin to fingerprints and DNA evidence, hold a vital role in forensic investigations. The comparison of shoeprints is utilized to determine whether two impressions originate from the same shoe, resembling the process used for fingerprint analysis. However, shoeprints found at crime scenes are often incomplete, requiring investigators to adeptly match them with suspects or compare them to other prints, either at the crime scene or from different locations. This undertaking demands a substantial investment of time, specialized knowledge, and expensive equipment. This study aims to create an advanced multilayer semi-supervised deep learning-based feature extractor designed to quickly match partial or full shoeprint images with those of suspects or other shoeprints, thereby streamlining the identification process. The research utilizes a dataset containing 936 distinct shoeprints, encompassing both full and partial impressions created through blood spatter and graphite. This dataset, comprised of 3,275 digital files, will be segmented, employing a combination of convolutional neural network (CNN) and Generative Adversarial Network (GAN) to extract latent features. The total similarity score will be determined using normalized cross-correlation. To validate the findings, the data will be split into training and testing sets using an 80/20 ratio, incorporating n-fold cross-validation techniques for rigorous validation. Currently, the experimentation phase is in progress, and the results will be compared with state-of-the-art techniques to evaluate their efficacy. This research aims to enhance the efficiency of forensic shoeprint identification and comparison, marking a substantial advancement in terms of time and resource conservation.

DESIGNING A MULTICOMPONENT HYDROGEL TO MIMIC THE PHYSICAL AND CHEMICAL PROPERTIES OF THE HUMAN BRAIN PARENCHYMA

AUTHORS

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ABSTRACT

Bioprinting has grown in complexity and popularity. Gelatin methacryloyl (GelMA), a modified biopolymer, is widely used in 3D bioprinters as a bioink. However, GelMA is an insufficient substitute for the brain parenchyma because brain tissue is low in collagen content. Our lab seeks to fabricate a novel hydrogel that captures brain parenchyma's physical/chemical characteristics. We incorporated methacrylated hyaluronic acid (HAMA) and PLGA nanoparticles to achieve this goal to mimic local therapeutic delivery. To ensure our in vitro mimic captures the viscoelastic properties of brain tissue, we conducted

compression and swelling tests on hydrogel samples. We performed these tests on three 8mm diameter cylindrical samples consisting of GelMA, GelMA-HAMA (GH), and GelMA-HAMA-PLGA (GHP). GelMA was synthesized via the addition of methacrylic anhydride (MAAnh) in a buffered solution. HAMA was synthesized by dissolving sodium hyaluronate in ultrapure water, adding MAAnhe, and maintaining a pH of 8.5-9. The PLGA nanoparticles were synthesized by dissolving PLGA in acetone and adding it dropwise to a poly(vinyl alcohol) solution. The compression testing was performed on a Univert Cellscale. The swelling testing involved leaving each sample in separate DI water baths over several days. Weight measurements were taken for the first few hours and diameter measurements were recorded over the full duration. Results from the compression testing indicated that GHP exhibited the highest compressive modulus and GelMA was the least stiff. This data and future rheological testing will further determine how our novel hydrogels may serve as laboratory models of the blood-brain barrier.

DETECTION OF SARS-COV-2 SPIKE PROTEIN SEQUENCE HAPLOTYPES AMONG NON-SYMPTOMATIC INDIVIDUALS DURING THE COVID-19 PANDEMIC

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ABSTRACT

In late 2020 and early 2021, nonsymptomatic students and employees at Abilene Christian University were offered free qPCR-based testing for SARS-CoV-2. To identify variants, RNA from 200 randomly chosen positive test samples was converted into cDNA for PCR and Sanger sequencing of codons 1–220 and 400–700 of the spike protein gene. During the first month of testing, only one haplotype was recovered, corresponding to the D614G mutation found in the globally dominant B.1 lineage. Five similar haplotypes were recovered in the second month, and two of these were observed through 2021. However, amplification success was much lower than expected with only 47 of the 200 positive samples amplified and sequenced despite many attempts. Amplification was strongly correlated with the qPCR Ct values. Mean Ct of successfully amplified samples ($\bar{x}$=24.9, SD=5.5) was significantly lower than for unamplified samples ($\bar{x}$=36.9, SD=3.3). Only 6.5% of amplified had Ct > 32, and only 7.1% of nonamplified had Ct < 32. Furthermore, the Ct values of all 200 samples were not normally distributed, whereas the Ct values for amplified samples is approximately normal. Fall Ct values were also significantly lower (n=133, $\bar{x}$=33.0, SD=7.0) than spring (n=67, $\bar{x}$=36.5, SD=3.9), and only two spring samples could be sequenced. Together these results suggest that few nonsymptomatic individuals shed sufficient RNA for Sanger sequencing and that a Ct value threshold < 33 might be needed for testing of nonsymptomatic populations. Demographic changes or infection histories of test subjects could explain low amplification success in final months of the study.

DETERMINING SIGINIFICANT PARAMETERS FOR BIOPRINTING PLGA NANOPARTICLE-LADEN BIOMATERIAL INKS

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ABSTRACT

Macromolecular therapeutics have the potential to provide paradigm-shifting treatment for neurological diseases; however, these therapeutics still face setbacks due to the selectivity of the blood-brain barrier. Our lab seeks to study the delivery of these therapeutics through nanoparticle-laden hydrogels that mimic the brain parenchyma. To enhance mechanical stability and chemical tunability, we encapsulated PLGA nanoparticles in hydrogels consisting of gelatin methacryloyl (GelMA), methacrylated hyaluronic acid (HAMA), and polyethylene glycol dimethacrylate (PEDGMA). The hydrogels were prepared by synthesizing each polymer in our lab and lyophilizing the modified material. The polymers were rehydrated in a phosphate-buffered saline solution and combined at a weight percentage of 10, 2, 1–5, and 5 wt%, respectively. A simple design of experiments (DOE) was performed to determine the printability of the hydrogel. We tested several factors and combinations of factors, including needle length, pressure, speed, and temperature/material type. Filament uniformity and filament fusion tests were performed to estimate extrusion width and resistance to collapse under the effect of surface tension. “Wood-pile” lattices were printed, and the pore size was assessed using an ImageJ algorithm, which allowed us to determine the fidelity of the printed construct by comparing the result to the 3D geometry. We plan to evaluate how the addition of nanoparticles

impacts the rheological properties of the final hydrogel. We then plan to employ this in a model with glioblastoma cells to evaluate the therapeutic potential of the system.

DEVELOPING A CHROMATOGRAPHIC SYSTEM FOR DETECTING RNA-CHOLESTEROL ADDUCTS

AUTHORS

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ABSTRACT

RNA modification is at the cutting edge of epigenetics, and the number of these adducts regulating gene expression and cell differentiation is increasing. Several findings correlate regulated expression of tumor suppressors with an ambience of oxysterols, or oxygenated cholesterol. These sterols potentially modify transcripts of tumor suppressors to regulate their expression. While there is enough evidence for chemical modification of RNA by cholesterol or its metabolites, to our knowledge, these putative RNA-cholesterol adducts have never been investigated. Since modified nucleotides possess distinct chemical properties from their originals, we separated these adducts from their components; both polar and nonpolar, using glass plate-backed silica gel thin-layer chromatographic (TLC) systems. Based on established analytical advantages of TLC for complex lipids, we modified the protocol to detect a synthesized RNA-cholesterol construct with obvious amphipathic properties. Since we could not practically separate the three components in one solvent system, we developed the plates sequentially using polar and nonpolar solvent systems in a rapid unidimensional procedure. Our results reveal that iodine vapor is a versatile detection reagent for this adduct and its molecular components. Also, mobile solvents resolved the adduct and its components differently based on their polarities. In our dual development system, the faintness of the iodine vapor spots seems to implicate the developing solvent-enhanced oxidation of the components, correctable by drying under nitrogen. Our procedure may facilitate sensitive and sharp resolution of these adducts in vivo and provide new layers for speedily investigating gene expression regulation and tumor cell differentiation by these adducts

DNA BARCODING OF VARIOUS SPECIES OF BEES IN TEXAS

AUTHORS

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ABSTRACT

DNA Barcoding as an Identification Method for Texas Bees
TAS Abstract
Erin Miller, Pritika Thotakura
Bees play a crucial role in maintaining ecosystem health and stability, and are considered to be keystone species due to their diverse pollination services. Many plants rely on bees for pollination, and different bee species have distinct body morphologies and foraging preferences that result in diverse pollination patterns. These differences in pollination services make it essential to have a large diversity of bee species in healthy ecosystems. Therefore, it is important to determine the diversity of local bee species to predict agricultural success and determine the health and biodiversity of a local ecosystem. However, there has been inadequate research on bee diversity in North Texas, which is an important area for agriculture and home to the endangered Blackland prairie. To address this knowledge gap, we conducted a study to investigate the bee diversity of Grayson County in North Texas using DNA barcoding of local bee species. Our study aims to determine the regional bee diversity and ultimately expand DNA barcoding databases. By improving our understanding of local ecosystem biodiversity, we can predict agricultural yields based on bee pollination services and ascertain ecosystem health and stability. Additionally, expanding and improving local DNA barcoding databases can benefit future biodiversity research.

DRINKING WATER CONTAMINANT MIXTURES: EXPOSURE TO LEAD, COPPER, AND GLYPHOSATE

AUTHORS

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ABSTRACT

The interactions of multiple chemical constituents are an understudied, yet important area of research. Two avenues of study need to be examined simultaneously; they include chemical interactions and mixtures toxicology. Studies involving mixtures toxicology is sparse because these studies are challenging to design, execute, and interpret results. More evidence based scientific data is needed to populate risk assessments of mixtures, interactions, and induced human health effects. In this study, we focus on multiple water contaminants of high concern today. First, copper and lead ions are present in drinking water systems. Second, glyphosate, the functional ingredient in many pesticides, is also detectable in water. Here, we produced dose-response relationships using non-linear curve fitting supplemented with concentration addition modeling to perform

isobolographic analyses and assess the synergistic effects and interaction indices of multiple chemicals simultaneously exposed to a human neuronal cell culture model. Effects of chemical compositions can be calculated as additive, antagonistic, or synergistic as compared to the effects of the individual chemicals vis graphical analyses of LC_{50} values in two- and three-dimensional plots and calculations. Our results show that the binary mixtures of copper and lead as well as the binary mixture of copper and glyphosate induce an antagonistic response. Interestingly, the binary mixture of lead and glyphosate induced an additive response. Research suggests that tertiary mixtures have the potential to induce synergistic responses. However, preliminary data suggests that the response for copper, lead, and glyphosate is antagonistic. This study emphasizes the relevance and need for more mixture toxicity research.

ECOJEDI SUMMER RESEARCH PROGRAM IN AGRICULTURAL SCIENCES - YEAR 2

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ABSTRACT

The EcoJEDI program is a four-year study funded by the U.S. Department of Agriculture, National Institute of Food and Agriculture. The program is a collaboration among the University of Texas at San Antonio, Our Lady of the Lake University, and Northeast Lakeview College in San Antonio. The program provides underserved student populations in the greater San Antonio area with career development, summer research experiences, and access in field of natural resources management. Students in the program are in various stages of their degree including A.S., B.S., M.S., and Ph.D. During year one, students participated in field trips to natural areas and private lands, heard from multiple guest speakers with various organizations including USDA, developed counter-story projects, participated in writing and communication workshops, were provided instruction on professional development and mentoring, participated in research projects, and attended and presented posters at a regional conference. Three undergraduate students completed a summer internship with the U.S. Forest Service at Bent Creek Experimental Forest in Asheville, North Carolina. An overview of these events in 2023 and plans for the second cohort in 2024 will be discussed at the conference.

EFFECTS OF TRANSCRANIAL INFRARED LASER STIMULATION ON PREFRONTAL FUNCTIONAL CONNECTIVITY AND IMPULSE CONTROL IN ADULTS WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER

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ABSTRACT

Adults with attention deficit hyperactivity disorder (ADHD) often experience reduced quality of life due to difficulties with impulsiveness and attention. Functional near-infrared spectroscopy (fNIRS) studies show a lower hemodynamic response in the right prefrontal cortex (PFC) of ADHD participants during the execution of a go/no-go inhibitory task. Transcranial infrared laser stimulation (TILS) is a non-invasive form of photobiomodulation (PBM) that promotes the hemodynamic response in PFC. Results from our preliminary study on adults with ADHD showed that TILS can enhance participants' performance on the Continuous Performance Test (CPT), a task designed to measure impulsivity and inattention. This promising finding led us to design a study to evaluate the impact of TILS in adults with ADHD to investigate the underlying neurobiological mechanisms responsible for this neurobehavioral improvement, potentially based on enhancing PFC hemodynamic response. Our ongoing study consists of two groups of ADHD participants, with each group randomly receiving either active or placebo TILS, targeting 26 participants for each group. Eligible participants are adult individuals with a diagnosed history of ADHD, on stable medication or not taking medication. Before and after undergoing an 8-minute administration of placebo or active 1064 nm TILS to the lateral and medial right PFC, each participant completed a 14-minute, computer-based CPT task. The fNIRS data from the PFC are collected before and after TILS treatment, while participants engage in a 2-back working memory task. Data analysis is ongoing for 30 completed participants so far. Supported by the Oskar Fischer Project and the Elhapa Foundation.

ENGAGE A LOW-COST FATIGUE MACHINE TO MAP DIGITAL IMAGE CORRELATION BASED ON FATIGUE STRAIN ON A 3D PRINTED PART

AUTHORS

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ABSTRACT

An Formlab Elastic 50A resin-based 3D printed block underwent repeated compressive loading at a frequency of 1 Hz, employing an eccentric cam profile. The test spanned six hours and encompassed the acquisition of a total of four images at 30-minute intervals during the first two hours, six images at 20-minute intervals during the third and fourth hour, 12 images at 5-minute intervals during the fifth hour, and 30 images at 2-minute intervals during the sixth hour. Using a low-cost fatigue testing machine, in which the cam profile is integrated onto a shaft, the cam profile is designed to induce a one-eighth of an inch deflection of the 3D-printed block for each cycle smoothly. After analyzing the image obtained during the testing process a digital image correlation (DIC) will be utilized to explore the effect of cyclic fatigue on the 3D printed blocks. We anticipate that there will be no permanent deformation of that 3D printed block, but the strain mapping will start taking a more concave shape at the point of contact point after a couple of hours of operation, indicating strain hardening underneath the 3D printed top surface.

ETHICS: GENERATIVE AI IN SCIENCE EDUCATION

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ABSTRACT

Generative Artificial Intelligence (AI) is a technique that uses large amounts of existing data to create text, graphs, imagery, audio and synthetic data based on neural networks. Textual output can also use large language models (LLMs) to generate complete sentences and even papers on a variety of subjects. These powerful tools do pose new ethical challenges. AI tools are trained on large data bases from which they can draw inferences. Generative AI LLM tools can, in the simplest form, be thought of as consisting of four modules Input, Computation, Analysis and Output. Use of Generative AI tools in education to generate reports and term papers present a range of ethical issues. Ethical use of such tools can result in:

- Increased subject understanding
- Higher grades
- Enhanced career progress

Over reliance on AI tools can limit a student's creativity and critical thinking, reduce subject proficiency, and lower overall grades.

Keys for ethical and successful use of Generative AI tools include:

- Recognition that Generative tool products are non-referenceable
- Attribution of specific sections of the work to the Generative AI tool
- Review of the tool products to identify "Hallucinations"
- Check reference validity and significance
- Careful training data set curating
- Use of tools that are Explainable (XAI)

Conclusion

As with all tools, learning and productivity can be enhanced through the use of Generative AI. Again, as with all tools, Generative AI can be misused, resulting in potentially undesirable impacts. The decision is up to an informed user.

EVALUATING PATTERNS OF RED-SPOTTED TOAD OCCURRENCE AND REPRODUCTION IN A DYNAMIC DESERT SYSTEM

AUTHORS

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ABSTRACT

Amphibians are the most threatened vertebrate taxa in the world. Their susceptibility to threats is 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. Amphibians may be particularly at risk in highly dynamic systems like the Sonoran Desert, where the availability of habitat they require for activities like breeding can vary both spatially and temporally and may not be available when needed. As the impacts of climate change, water management practices, and land development alter the quality and timing of resources for amphibians in the Sonoran Desert, identifying important habitat characteristics for adult and tadpoles

may be vital to future conservation of populations. To investigate habitat characteristics related to patterns of adult occurrence, breeding effort, and breeding success (defined as presence of tadpoles), we sampled waters across the Barry M. Goldwater Range- East for amphibians in five years using visual, acoustic, and dip-net survey methods and implemented a multi-state dynamic occupancy model. We modeled this relationship for red-spotted toads (Anaxyrus punctatus) as they are abundant and highly detectable in this region and may provide a good proxy for other less abundant species with similar habitat requirements, such as the Sonoran Desert toad (Incilius alvarius). Results from this model can inform management actions that protect core amphibian breeding sites and improve timing of resources important to successful breeding.

EXAMINING THE EXPERIENCES OF WOMEN STEM FACULTY IN WEST TEXAS

AUTHORS

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ABSTRACT

This research has focused on exploring the mentoring experiences of women STEM faculty at the University of Texas Permian Basin and Texas Tech University, in hopes of attracting, recruiting, and retaining female students in typically male-dominated STEM careers fields. As part of the HSI-STEM Research Program for Undergraduates (RPU) grant, four Latina undergraduate students worked with Dr. Sparks in 2022 and 2023. The team interviewed 12 women STEM faculty members at two West Texas universities and a small group of 4 women were representatives of the oil and gas industry. Three focus groups were also conducted. Preliminary data revealed unique perspectives and challenges related to success, advancement, and mentoring. These results will be shared. The Project Aims included the following: (1) Train undergraduate students in qualitative research methods, including case study, phenomenology, and narrative analysis, and (2) Seek to understand the experiences of female students in STEM fields at UTPB, especially those who are in typically male-dominated STEM career fields.

EXTRACELLULAR MATRIX DERIVED FROM MESENCHYMAL STEM CELLS DRIVES CONTRACTION IN A WOUND MODEL

AUTHORS

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ABSTRACT

For diabetics, the risk of developing an ulcer is between 20-35%. Ulcers are a major cause of amputation. Currently, there is a larger focus toward wound care, with some options for moderate cases such as Regranex. This medication stimulates angiogenesis and skin cell replacement. Ulcers commonly reappear even with treatment, and the 5-year mortality rate for diabetics with ulcers is 2.5x the risk of those without. Effective skin regeneration strategies reduce the mortality rate and have a greater impact on morbidity in the diabetic community. We developed a mesenchymal stem cell derived extracellular matrix (ECM) with osteogenic properties. We hypothesized this matrix might be effective in skin healing due to its unique composition. To test this hypothesis, we used a three-dimensional assay that mimics granulation tissue formation, where human umbilical vein endothelial cells (HUVEC) reproduce initial steps of new blood vessel growth. In these experiments, HUVEC migration and sprouting into collagen matrices was quantified. Although no clear differences were seen in invasion distance, there were some differences in invasion density. One notable observation was that the frequency of contraction in the collagen matrices increased as the concentration of matrix increased, and the effect was verified at multiple time points. This was encouraging because tissue contraction is a major downstream event in skin healing and wound closure. In summary, this in vitro work suggests ihECM may have therapeutic potential in the treatment of diabetic skin lesions, particularly enhancing wound closure. Testing in diabetic wound models in mice is underway.

FACTORS INFLUENCING MICROBIAL DIVERSITY WITHIN AN EAST TEXAS FLUVIAL NETWORK

AUTHORS

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ABSTRACT

Freshwater stream ecosystems are rich in microbial life and various environmental factors may influence the diversity of these microbial communities. By virtue of the continuous flow of water from upstream to downstream, rivers form a metacommunity linked by downstream dispersal of organic materials and microorganisms. River ecosystems are further complexed with microhabitats including the benthos and the water column. Drawing from ten months of monitoring a forested headwater stream (temporal study), we investigated correlations between microbial diversity and eight potential

drivers: dissolved organic carbon (DOC) concentration, aromaticity, ($SUVA_{254}$), molecular weight (spectral slope ratio), nutrients (total nitrogen, nitrate, phosphorous), and precipitation. Additionally, we explored the microbial diversity patterns along a longitudinal gradient (longitudinal study). We found that the diversity of benthic microbial communities was negatively correlated with DOC molecular weight, but no other variable. Alpha diversity metrics of water column microbial communities were positively correlated with DOC concentration and molecular weight and distance longitudinally. In comparison, temporal microbial diversity was positively correlated with DOC concentration and aromaticity and precipitation, but negatively correlated with phosphorous. Within the longitudinal study, a clear pattern emerged in which there was higher diversity at the unimpacted large river site than in the headwater sites, but that diversity decreased once the river flowed into an artificial reservoir, and especially so downstream of the dam itself. In summary, we found a longitudinal pattern in microbial diversity that was impacted by dam influence, and that water and benthic microbial communities are influenced by differing environmental factors.

FEAR OF EXTINCTION: NEOPHOBIA AS A POSSIBLE MECHANISM FOR THE MAINTENANCE OF AN ASEXUAL-SEXUAL FISH SYSTEM

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ABSTRACT

Stable coexistence of asexually and sexually reproducing organisms is a conundrum—asexuals should immediately dominate due to a two-fold all-female advantage, whereas sexuals profit from the long-term benefit of variation from recombination. Understanding how these two reproductive systems affect phenotypic variation can illuminate mechanisms that explain the current coexistence of asexual-sexual systems and how each reproductive mode will respond to future environmental, especially anthropogenic, change. The asexual Amazon molly (Poecilia formosa) and sexual sailfin molly (P. latipinna) have coexisted for over 100,000 years, and currently there are little to no known differences in their ecological niches. Thus, we explored object neophobia (fear of novel objects) as a possible behavioral mechanism allowing for stable coexistence between the two fish species. We observed the amount of time it took for female sailfin mollies and Amazon mollies to approach a feeding dish with one of three types of objects nearby—control, novel, and predator. If one species has less neophobia, it could increase their access to new resources and habitats, but also expose them to higher predation threats. This balance between resource acquisition and predation could be the key to continued coexistence in asexual-sexual systems.

FROM DATA TO DEGREE: EMPOWERING INSTITUTIONS TO SUPPORT STUDENT SUCCESS THROUGH ARTIFICIAL INTELLIGENCE

AUTHORS

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ABSTRACT

Stephen F. Austin State University (SFA) collects vast amounts of student data, but only a small portion is actively utilized for retention and success. This project suggests the implementation of contemporary data analytics and artificial intelligence (AI) methods to promptly identify students at a high risk of academic disengagement. The goal is early intervention to facilitate timely graduation, aligning with SFA's strategic objective of achieving "meaningful and sustained enrollment growth." Over the course of two years, our efforts have concentrated on compiling institutional data, encompassing meal plans, residence occupancy, course performance, and learning management system usage. The amalgamation of these datasets, alongside advanced artificial intelligence techniques such as deep learning, unleashes the potential of the data to effectively reach and support students, resulting in a mutually beneficial outcome for both the university and its students. This presentation shares preliminary findings and methodologies, emphasizing the efficacy of a random forest classifier in identifying at-risk students and determining the metrics influencing such student outcomes. Furthermore, a recurrent neural network was employed to analyze the data over specific time intervals, achieving an 86% accuracy and 88% f1-score in classifying at-risk students. The research also introduces a comprehensive end-to-end infrastructure solution for data storage, development, and front-end interface, empowering stakeholders like advisors to provide timely support for student success. The proposed methodologies are adaptable for implementation by other educational institutions, tailored to their specific institutional data.

GREY OAK MORTALITY AND AN UPDATED FLORA OF SUL ROSS'S HANCOCK HILL

AUTHORS

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ABSTRACT

A recent three-year drought (2020 – 2022) occurred in Brewster County, Texas, resulted in apparent landscape-scale floristic changes. The gray oak woodlands on Sul Ross State University's publicly accessible Hancock Hill provided an opportunity to quantify the drought's impact amidst the context of climate change. In the fall of 2022 and winter of 2023, we sampled 239 trees to estimate the number of trees damaged from the drought and determine if density or age class were driving factors. Additionally, four vegetation transects were run across the hill to determine if any observable ecological changes had occurred since 1958, the last time demographic transects were published. This allowed us to compile a comprehensive list of plants that has not been documented on the hill since H. J. Cottle conducted the hill's first flora in 1929. Findings showed that the hill supports at least 277 plant taxa, consisting of 62 families. Asteraceae and Poaceae were the dominate lineages on the hill. Statistical comparisons between transects run in 2022 and 1958 suggest that substantial ecological changes have occurred, with forbs and shrubs significantly ($p < .05$) more frequent on the hill. The composition of grasses has shifted, and annuals were among the most frequent plants encountered. Oak mortality results showed that nearly 7% of the sexually mature trees on Hancock Hill perished during the drought, while an additional 21% suffered significant damage. This proportion is consistent with the recent extreme 2011 Texas drought's impacts. Saplings were lacking, suggesting stand replacement is lagging.

HBA1C, A BIOMARKER OF TYPE2 DIABETES: A MOLECULAR CASE STUDY

AUTHORS

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ABSTRACT

The American Diabetes Association has recommended glycated hemoglobin (HbA1c) as a biomarker for diagnosis of diabetes. HbA1c level in blood dictates an individual's average blood glucose levels during the past two to three months. Adult human red blood cells contain over 90% hemoglobin A (HbA) protein. Structurally HbA1c and HbA are identical except the N-terminal amino groups of valine residues of both beta chains of HbA1c are attached to a carbonyl group of an aldehyde or ketone of hexose sugar by a Schiff base. This molecular case study is designed to introduce students to molecular visualization and analysis of HbA1c and oxygenated and deoxygenated forms of normal HbA. It aims at exploration of the molecular basis of the normal and glycated protein molecules and engage students in using Protein Data Bank data from open access biological databases, and bioinformatics tools. The present interdisciplinary case study includes selected modules from organic chemistry and biochemistry and can be used in teaching Organic Chemistry, Biochemistry, and Structural Biology.

HEALTH STATUS OF SEA URCHIN COMMUNITIES IN ROATÁN, HONDURAS

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ABSTRACT

Seven sea urchin species are native to the Caribbean Sea. In both 1984 and 2022, D. antillarum faced Caribbean-wide mortality events which reduced populations by approximately 93-99%. The cause of the 2022 mortality was determined to be a scuticociliate protist, and the condition was termed D. antillarum scuticociliatosis (DaSc). This study was conducted to assess the population status of urchin species, as well as the current health status of D. antillarum at Anthony's Key and Bailey's Key in Roatán, Honduras. Three shore sites were surveyed twice using a modified Randell-Robertson Marine Survey Technique (RRMST), and a health assessment for D. antillarum was performed. Substrate preference was also noted. Diversity was measured using the Shannon-Weaver Diversity Index. Species prevalence relied on the presence of specific substrates and diversity varied greatly among sites. Sites A and C had low indecies ($H=0.02$ and $H=0.15$) due to the presence of rock, which allowed for E. lucunter to thrive ($n=>1,000$). E. viridis was also found with rock, but to a much lesser degree ($n=12$). Site B had seagrass beds, algae, and mangrove prop roots, which resulted in a higher index ($H=1.33$). T. ventricosus and L. variegatus had greater numbers when large seagrass beds were present ($n=25$ and $n=29$). E. tribuloides was observed twice, and no L. williamsi were observed. A total of 40 D. antillarum were located and all were healthy, with 60% preferring rock and 22% preferring a combination of sand and algae. These findings suggests that DaSc did not reach Roatán.

HIGH VS. LOW-INTENSITY EXERCISE TRAINING IMPACT ON DROSOPHILA RECOVERY FOLLOWING HYPOXIA

AUTHORS

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ABSTRACT
The purpose of this experiment was to determine whether low-intensity or high-intensity exercise had a greater impact on recovery of Drosophila melanogaster following hypoxia. This was achieved by inducing hypoxia in Drosophila using a hypoxia chamber. Half of the trials used nitrogen gas while the other half of the trials used argon gas to create hypoxic conditions in the chamber. Then the flies were exposed to either high- or low-intensity exercise for 30 minutes using a Drosophila Activity Monitoring (DAM) System. Their activity levels were measured by the number of movements recorded by the DAM System every 30 seconds both during and after exercise. Drosophila has become a model organism for exercise research. Current research with these fruit flies focuses on the impact of diet on exercise, exercise on activity levels, and endurance exercise. Hypoxia, or an inadequate amount of oxygen in the tissues can result in many of the world's leading causes of death, such as myocardial infarctions and ischemic strokes. The focus of this experiment was to study the effects of low-intensity exercise and high-intensity exercise on Drosophila activity levels as an indicator of which exercise type is best suited to help patients recover from conditions induced by hypoxia.

IDENTIFICATION OF BIOMARKERS OF SUB-LETHAL ALGAL TOXIN EXPOSURE IN ATLANTIC SALMON (SALMO SALAR) AND CHINOOK SALMON (ONCORHYNCHUS TSHAWYTSCHA) USING DIFFERENTIAL GENE EXPRESSION ANALYSIS

AUTHORS
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ABSTRACT
Atlantic Salmon (Salmo salar) and Chinook Salmon (Oncorhynchus tshawytscha) are important aquaculture species in Canada and the United States. Blooms of harmful cyanobacteria introduce microcystins into coastal ecosystems and have been linked to net-pen liver disease, which has large financial impacts on net pen salmon operations. Microcystins bioaccumulate in the liver and disrupts normal cellular activity by inhibiting protein phosphatases leading to deleterious effects on growth, immune status, and liver function. To minimize economic loss producers have interest in using biomarkers of microcystin exposure to mitigate these impacts. RNA-sequencing was performed on liver samples from Atlantic and Chinook Salmon fed algal paste containing microcystin-LR to evaluate changes in gene expression caused by toxin exposure. TopHat2 was used for transcriptome assembly and alignment of reads to reference genomes. Differential gene expression analysis was performed using DESeq2. The transcriptome response was examined at several time points following exposure to determine the most useful candidate biomarkers and to evaluate windows of detection. Complementing previous microcystin research on fish, this study reports many differentially expressed genes and pathways related to the cell cycle, microtubule integrity, apoptosis, oxidative stress, inflammation, and metabolism. For both salmonids several genes (wdr3, bag3, cish, cdc14b, fosl2, il34, relb, stk17b, traf3, ttll2, agr2, and surf6) were identified as candidate biomarkers but require validation in a hatchery setting. These biomarkers have the potential to serve as early warning signs that will allow aquaculture managers to decide to harvest early to avoid large mortality events caused by these algal toxins.

INFLUENCE OF FLUCTUATING WATER LEVELS ON SHOREBIRD USE OF PLAYAS IN WEST TEXAS

AUTHORS
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ABSTRACT
Across the West Texas region, playas serve as a vital resource for shorebirds during their Spring-Summer migration. Playas provide rest and nourishment, fueling the migrant shorebirds to their breeding grounds. Due to the semiarid nature of the West Texas region, playa resources dwindle or dry up during Spring and Summer. Limited information exists regarding the impact of fluctuating water levels on the quantity of migratory shorebirds at the playas. Here we show that water level is a driving force which has a significant relationship with the amount of birds observed on a playa. We found that after rainfall events when water level increased, the width of shore in all cardinal directions decreased. For shorebirds, this resulted in significantly fewer birds observed using the playas. We observed 21 species of shorebirds, 4 of which are known to breed in the area. Our results demonstrate that water levels and amount of shore present for the shorebirds are important factors influencing where they stop to rest or refuel. We anticipate that our study will help to better understand the niche relationship between fluctuating playa water levels and shorebirds observed using the playa resources. For example: the preservation of playas and their optimal water levels will be beneficial to conservation of shorebird populations, many of which are in decline.

INFLUENCE OF PERLITE-BIOSOLID COMPOSITION ON GROWTH AND UPTAKE OF CD AND MN BY RADISH (RAPHANUS SATIVUS L.) UNDER GREENHOUSE CONDITIONS

AUTHORS
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ABSTRACT

The effects of different perlite-biosolid compositions upon the uptake of Cd and Mn, and the growth of radish plants (Raphanus sativus L) was investigated by using inductively coupled plasma optical emission spectroscopy, and inductively coupled plasma mass spectrometry (ICP-OES and ICP-MS). Mn and Cd were added in soluble forms to perlite-biosolid compositions. Notably, Mn concentrations in different plant parts was found to increase with increasing biosolid compositions, in the order $[Mn]_{leaves} > [Mn]_{shoot} > [Mn]_{roots}$. This is plausible for Mn, in conformity with the essential role Mn plays during photosynthesis, in metabolic processes, and oxidation-reduction processes in cells. Results indicate Mn concentrations in plant parts increased up-to ~50% (wt/wt) perlite-biosolid application rates. In contrast the Cd uptake concentrations in plant parts decreased in the order $[Cd]_{roots} > [Cd]_{shoots} > [Cd]_{leaf}$. Thus, toxic Cd tends to be sequestered in the roots vis-à-vis Mn that is translocated to the leaves. These results suggest that radish plants sequester Cd in the roots. Biosolids therefore play an important role in sequestering and binding of Cd. The observed concomitant increase in biomass yields implicates the rich contribution of N and P from biosolids. The results from the greenhouse experiments leads to the conclusion on the role played by the biosolids in clean up and remediations for Cd and Mn, which increased in plant parts with Composted Wastewater Sludge - compositions.

INVESTIGATING CANCER-ASSOCIATED PROTEINS DURING HIBERNATION IN THE THIRTEEN-LINED GROUND SQUIRREL

AUTHORS

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ABSTRACT

The phenomenon of hibernation is a unique and complex process that still remains to be understood on a molecular level. Hibernation involves changes in the pathways that control bodily functions in order to slow overall cellular activity. This is accompanied by significant changes in gene expression and cellular homeostasis. Anecdotal evidence suggests that animals that hibernate display resistance to cancer as many of the signaling pathways involved in tumor formation are altered. This includes molecules like p38 and ERK which are central to the stress-induced kinase pathways. Additionally, the transcription factor c-Myc is implicated in many human cancers and could play a role in mitosis regulation during torpor. This project aims to analyze changes in these proteins involved in regulating processes such as mitosis, apoptosis, and cell survival throughout the phases of hibernation in thirteen-lined ground squirrels. These proteins will be analyzed at multiple time points and in multiple tissues including the hypothalamus, skeletal muscle, white adipose tissue, and brown adipose tissue. The plasma of hibernating animals will also be used to treat cancer cells to identify possible anti-cancerous properties of torpor-associated proteins. This data could provide insight into how certain pathways can facilitate both tumor regulation and homeostasis during hibernation.

INVESTIGATING PA28Γ'S ROLE IN ANGIOGENESIS THROUGH REGULATION OF THE PKA PATHWAY

AUTHORS

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ABSTRACT

PA28γ is a ubiquitin and ATP-independent proteasome activator that is overexpressed in many cancers and is documented to contribute to a wide array of cancer hallmarks. PA28γ has not been thoroughly investigated in angiogenic signaling, but it has been indirectly linked to the process of angiogenesis by acting as an upstream regulator for some pro-angiogenic factors. Previous research suggested that PA28γ may positively regulate angiogenesis by disturbing the PKA/FoxO1 pathway via degradation of the PKA catalytic subunit-α (PKAca) in noncancerous mice embryonic fibroblasts (MEFs). The current study aimed to reproduce these data and replicate this pathway in various mouse cancers, including A9 mesenchymal tumor cells and Lewis lung carcinoma (LL/2) cells. Western blotting revealed an inverse relationship between PA28γ and PKAca in MEFs and cancerous cell lines; however, A9 and LL/2 cells genetically edited to produce reduced levels of PA28γ did not reveal any differences in PKAca expression. Furthermore, samples treated with proteasome inhibitor MG132 did not yield variations in PKAca. These results suggest that while PKAca is degraded in cancer, it is likely not mediated by PA28γ-proteasomes. Other potential targets of PA28γ that are reportedly phosphorylated by PKA (FoxO1 and CREB) were also measured through western blotting. No significant difference was observed in total protein nor phosphorylation for FoxO1. Total CREB levels were higher in the cancer cells; however, this trend was not observed for phosphorylated CREB. Therefore, it appears that PA28γ does not act as an upstream regulator of the PKA-mediated phosphorylation of FoxO1 or CREB in cancer.

INVESTIGATION OF RESIDUAL MINERAL CONTENT OF BAUXITE PILES: SALINE MINING DISTRICT, ARKANSAS

AUTHORS

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ABSTRACT

The former mining town of Bauxite, Arkansas is in the Saline County Mining District, in Central Arkansas. This area contains extensive deposits of bauxite ore and nepheline syenite previously mined by Aluminum Company of America using open pit

and subsurface mining techniques. Over the past several years, there has been renewed economic interest in minerals that can be derived from bauxite and related residues. In Spring 2023, 129 samples were collected from five stock piles and analyzed for critical minerals based on varying concentrations of iron, titanium, and aluminum. Within the stockpiles, pisolitic clast samples were analyzed separately from the matrix to determine the primary source of these minerals. These samples were compared to NIST SRM 698, Jamaican Bauxite standard, to determine elevated concentrations of critical minerals present in Central Arkansas bauxite stockpiles. X-ray fluorescence results from the stockpiles identified elevated concentrations of molybdenum, niobium, thorium and zirconium, which are listed on the 2022 United States Geological Survey Final List of Critical Minerals. Arsenic, uranium, strontium, and rubidium concentrations were elevated, but varied based on alumina content. Bauxite clasts contained higher levels of neodymium, praseodymium, cerium, lanthanum, and barium with respect to the matrix material. The relationship between bauxite stock pile aluminum concentrations and the presence of critical minerals could potentially lead to a future economic supply of important resources.

IT TAKES TWO TO TANGO: REDOX INTERPLAY WITH AMINO ACID MODELS

AUTHORS

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ABSTRACT

Cooperativity between multiple redox sites is ubiquitous in enzyme systems. This cooperativity allows for the use of cheap Earth-abundant metals, which typically undergo one-electron redox processes. The key design features which allow for redox cooperativity are not well understood. In an effort to design new experimental model systems, computational chemistry is employed to gain insights into the role of energy matching, distance dependence, and geometric orientation for redox communication. Previously, our group has highlighted the interplay between cobalt and a pyridine-di-immine (PDI) ligand system by a unique electronic configuration. This talk will focus on the interplay of transition metals and models for oxygen/sulfur containing amino acids. The added O/S atom spacer between the metal and aromatic ring cause significant geometric requirements for electronic communication.

JUMPING IN THE DEEP END: QUANTIFYING ENVIRONMENTAL DNA CONCENTRATIONS OF POMACEA MACULATA AT VARYING DEPTHS IN A SOUTH AUSTIN POND

AUTHORS

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ABSTRACT

Facilitated by human actions such as aquarium dumping, organisms often establish populations in unexpected places. In 2019, non-native, invasive apple snails (Pomacea maculata) quickly took over a small pond (Bear Lake) in South Austin, TX. During pandemic times, local homeowners quickly responded and removed an estimated 99% of the population, nearly 5,000 snails. Despite extensive manual removal, visual and environmental DNA traces of the species remain. Since October 2021, we have monitored snail presence using environmental DNA (eDNA), which is genetic material shed by organisms in the form of cells and other biological wastes. Increasingly used to inform species management, eDNA provides a way to monitor snail presence during non-reproductive times of reduced activity. Over 18 months, we confirmed small spikes of eDNA over time indicating that a few apple snails persist. We sought to determine the source of this eDNA and hypothesized that deeper areas of Bear Lake provide a refuge. To test our hypothesis, we used a Van Dorn sampler to collect water from at least four depths (surface, 1-m, 2-m, and varying bottom depths) at five mid-lake locations. We compared these concentrations with previous surface water samples collected near shore. If snails use the deeper water as a refuge from temperature fluctuations in colder months, we predict that samples collected closer to the bottom will show more eDNA. Understanding how snails continue to persist in this pond will help create management plans to completely eliminate them or monitor their population for any indication of resurgence.

KARST PHENOMENA AND SPELEOGENESIS OF DEVIL'S RIVER STATE NATURAL AREA

AUTHORS

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ABSTRACT

Devil's River State Natural Area covers approximately 150 square kilometers in Val Verde County, Texas, on the western edge of the Edwards Plateau. This TPWD natural area is divided into a northern and southern unit, the Del Norte and Dan A. Hughes

units, respectively. These units are separated by approximately 15 kilometers of private land but both border the eastern edge of the Devil's River. Surficial geology is primarily Cretaceous carbonates with the Segovia limestone cropping out across most of the Del Norte unit and Salmon Peak limestone dominating the Dan A. Hughes unit. The region between the northern and southern units is primarily Devil's River limestone and incised canyons contain Quaternary alluvium and terrace deposits. Current research indicates sparse karst development likely due to a sampling bias and need for more extensive field surveys. Documented karst phenomena are predominantly solutionally-widened fractures formed by epigene processes and isolated grottos associated with cliff/scarp retreat. However, caves have been documented that show more complex spatial patterns with morphologic features indicative of hypogene origins; these hypogene caves also exhibit variable epigene overprinting, primarily associated with breaching and speleothem precipitation. Steep canyons of the Devil's River suggest this fluvial system has been a persistent, long-term hydrologic low that likely induced the upward migration of fluids to promote early hypogene karst development while river incision and denudation breached these caves and enabled recent epigene overprinting.

LIMNO-TERRESTRIAL TARDIGRADES FROM LICHEN HABITATS ON QUERCUS VIRGINIANA TREES AT DIFFERENT EXPOSURES TO SEA SALT AEROSOLS IN SOUTHEAST TEXAS

AUTHORS

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ABSTRACT

Limno-terrestrial tardigrades react to environmentally stressful conditions by going into a cryptobiotic tun state. Salinity, an osmotic stress driving osmobiosis, also creates physiological stress which may reduce population abundance and differentially selects species composition in tardigrade communities. Tardigrade community abundance and composition in coastal zones may differ with proximity to the coast due to the degree of sea salt aerosol (SSA) exposure. This hypothesis was tested in summer 2023 by comparing tardigrade communities in lichen habitats epiphytic to Quercus virginiana (Live Oak) trees of Southeast Texas at a coastal stand of trees versus another 30 km inland. Coastal site SSA content collected for a month was 3-fold greater than at the inland site. The lichen samples from six trees per site were sorted for tardigrades under stereomicroscopy and a total of 158 specimens were observed by differential interference contrast microscopy and identified to species based on morphological characters. There was no significant difference between coastal and inland communities regarding abundance and composition, based on Bray Curtis distance analysis. Tardigrade communities appear resilient to salinity variation within the range studied for this limited study. However, of the nine species identified, three were unique to either site. Species identification based on morphological characters are being confirmed by molecular phylogenetic analysis of 28SrRNA gene and cytochrome oxidase I gene sequences. With molecular confirmations of identifications, these data will contribute to understanding the biogeography for tardigrade biodiversity of the Gulf Coast of North America.

MICROPLASTICS ANALYSIS IN SURFICIAL SEDIMENTS ALONG THE BRAZOS AND BOSQUE RIVERS, MCLENNAN COUNTY, TEXAS

AUTHORS

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ABSTRACT

Microplastics (MPs) in aquatic environments are a growing global concern. When plastic enters the water system, it leaches toxins and fragments into micro and nanoplastics. Microplastics adsorb toxic organic pollutants and enter the food web, where they adversely affect both human and environmental health. Approximately 80% of ocean plastic enters via coastlines and rivers, yet there is a paucity of data regarding MP levels in freshwater systems. This study analyzes microplastics in surficial sediments of the Brazos and Bosque Rivers, McLennan County, Texas and creates baseline figures to track changes in MPs in these waterways. Both shoreline and offshore sediment samples were collected from 7 sites. Samples were dehydrated, and 30 grams of dried sediment were portioned off and sent through the extraction procedure. Hydrogen peroxide (30%) was used to digest organic material. Samples were filtered with mesh sieves and MPs were extracted with a NaCl density solution. Microplastics were isolated via vacuum filtration. Nile Red and Fluorescent Microscopy were used for MP quantification analysis. Microplastics were found in all samples. Microplastic agglomerations were observed, which may be an artifact of the

digestion process. Primary MPs such as microbeads and preproduction nurdles were also observed. This study reports the first MPs sediment analysis on the Bosque and Brazos Rivers and the results indicate that MPs distribution is ubiquitous in the river's surficial sediment. Future research should focus on streamlining the MP extraction protocol and integrating water samples for pollution analysis.

MOLECULAR MODELING OF BIOACTIVE COMPONENTS OF LYCIUM RUTHENICUM WITH COX2

AUTHORS

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ABSTRACT

Uric acid (UA) is the metabolite of purine type substrate by Xanthine oxidoreductase. The imbalance of UA production and its excretion gives rise to asymptomatic hyperuricemia and gout. In the U.S., 9.2 million people adults have been diagnosed with gout in 2015-2016 (3.9% prevalence rate), while the hyperuricemia prevalence rate is 20% of the U.S. population. However, due to adverse effects and cost of mediation, only one-third of gout patients have been received treatments for lowering uric acid levels. In the acute gout, inflammation always occurs.

Bioactive components such as flavonoids from herbs, vegetables, and fruits are considered as a complementary treatment for gout and hyperuricemia without side effects since they have been found to inhibit the xanthine oxidase to lower the uric acid production. It is reported that Lycium Ruthenicum (Black goji beery) extract displays uric acid lowering and ant-inflammatory effects.

Our molecular docking of Black goji berry bioactive component with COX2 enzye, an inflammatory mediator, exhibits antiinflammtory property. The preliminary data supports earlier experimental studies towards anti-inflammtion in gout by natural product from Lycium Ruthernicum.

NON-COVALENT INTERACTIONS IN MOLECULAR DESIGN FOR SENSING TOXIC ANALYTES

AUTHORS

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ABSTRACT

Non-covalent interactions (i.e., hydrogen bonding, π-π interaction) is an attractive approach to design molecular sensor by introducing various fluorescence mechanisms. A series of Coumarin-enamine molecular probes has been designed, synthesized, and deployed to selectively bind with nerve agent tabun mimic, metals (Zn^{2+}, Cd^{2+}), and anions (CN^{-}, $CH3COO^{-}$, F^{-}, PO_4^{3-}). As non-covalent interactions are very weak bond typically (0 – 200) kJ. The weak non-covalent interactions between hydroxycoumarin-OH and enamine-NH formed a new six-membered ring through resonance assisted hydrogen Bonding (RAHB) to enhance conjugation. Upon the addition of target analytes, RAHB perturbed which produced unique optical responses because of sensor-analyte interactions. Furthermore, two more quinidine-coumarin molecular probes have been synthesized and have been found to bind metal cations (Cd^{2+}, Co^{2+}, Cu^{2+}, Fe^{2+}, Hg^{2+}, $Ni^{2+,}$ and Zn^{2+}) with high affinity in organic-aqueous media (DMSO-HEPES). The chemosensors coordinated to the Zn^{2+} ions in a two-to-one molecular probe with a log β of 9.3 M^{-2}. Upon the addition of the closed-shell metal ions studied, a fluorescence turn-on via an excimer formation (π-π interaction) is seen at 542 nm due to the quinaldine moiety adopting a syn arrangement when coordinated to the metal Zn^{2+} ions. Confocal microscopy monitored free Zn^{2+} ions in the Human Embryonic Kidney cell line HEK293 by coordinating with molecular probe.

ORIENTATION AND SIGNIFICANCE OF RIPPLE MARKS IN THE HICKORY SANDSTONE ALONG CRABAPPLE CREEK, GILLESPIE COUNTY, TEXAS

AUTHORS

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ABSTRACT

Well-developed ripple marks are present in the Hickory Sandstone along Crabapple Creek west of Crabapple, Texas. The type, orientation, and wavelength of the ripple marks in the Hickory Sandstone of the Cambrian System were described and measured. The ripple marks were divided into symmetrical and asymmetrical ripples. The ripple crests were classified as having three of the six different crest patterns which are: straight, sinuous, and catenary. The orientation of each of the ripple types was then plotted using GeoRose. The ripple marks type, orientation and wavelength were then compared with modern ripple marks data collected on the dunes, back shore, berm, runnels, and bars at Follett's Island. The orientation of the asymmetrical straight and sinuous ripple crest with a wave-length greater than 23cm (8 inches) produced a similar pattern to asymmetrical sinuous and straight crested ripple marks found on the berm and bar faces at Follett's Island. Using the relationship of the orientation of the asymmetrical ripple marks that run parallel to the beach on Follett's Island suggests that the asymmetrical ripple marks in the Hickory Sandstone were deposited parallel to the beach during deposition of the Hickory Sandstone. This orientation data would suggest that the beach face on the southern margin of the Llano uplift during the

Cambrian Period has an azimuth 110° after considering rotation of the area since deposition. The asymmetrical ripple marks also have a similar orientation pattern to the ripple crest orientation pattern of the asymmetrical ripple marks in the runnels on Follet's Island.

OUT OF THE FRYING PAN AND INTO THE FREEZER: SEX DIFFERENCES IN THERMAL TOLERANCE OF LIVEBEARING SPECIES

AUTHORS

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ABSTRACT

Sexual selection by female mate choice leads to elaborate differences between the sexes: males bear bright coloration, peculiar appendages, and intricate courtship displays. These do not come without a cost. Flashy traits intended for mates can also be perceived by predators. Additionally, the development of these traits or the act of displaying them can be metabolically costly. There is extensive research regarding these male-borne costs, however, very little is known about whether selected traits influence a male's resilience against environmental change. Using livebearing fishes as a model system, we investigated sex differences in thermal tolerance. We tested the thermal maximum and thermal minimum of male and female fish in three species—sailfin mollies (Poecilia latipinna), Panuco swordtails (Xiphophorous nigrensis), and western mosquitofish (Gambusia affinis). Bright coloration, elaborated fins, and courtship behavior is present in both sailfin and swordtail males, whereas mosquitofish males lack morphological elaborations and use a coercive mating style. Additionally, swordtail males have genetic size determination meaning large males exhibit elaborate looks and behaviors, but small males have no elaboration and use coercion. Thus, we expect bright elaborate males to have a narrower thermal tolerance than coercive males, and females to have wider thermal tolerances than males. With the Anthropocene well on its way, our understanding of sex differences in response to thermal change is vital to maintain diversity in this rapidly changing world.

OUTREACH IN SOUTHWEST TEXAS FOR INCREASING STEM EDUCATION INTEREST

AUTHORS

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ABSTRACT

In conjunction with the Noyce in La Frontera program at Sul Ross State University, the STEM and education faculty are incorporating outreach activities in southwest Texas to include math and science exhibits. We have been concentrating on activities surrounding the 2023 and 2024 eclipses using the La Frontera mobile STEM van. We will discuss some of the activities we have presented within the various communities and how these outreach efforts have increased math and science education interest. We will also include other activities we have presented with the STEM van and expectations of possible future exhibitions.

PATTERNS OF MORPHOLOGICAL VARIATION IN THE DENTITION OF NEOTOMA AND ITS CONSEQUENCES FOR INTERPRETING THE FOSSIL RECORD

AUTHORS

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ABSTRACT

Woodrats (Neotoma) are abundant and widespread in Pleistocene fossil deposits, occurring from Texas to Montana to California to New York. Therefore, identification of the dental material of woodrats is essential for interpreting the Pleistocene fossil record in a reliable way. The dentition of Neotoma shows more variation than is documented in published literature, in part because many species are not included in assessments of characters for species identification. I reviewed published literature for characters used to distinguish species of Neotoma based on individual teeth and toothrows. I documented dental variation through high-resolution photographs of the upper and lower dentition of large sample sizes (n = 30) of 8 of the 23 extant species of Neotoma and at least 1 individual of an additional 9 species. I use those photographs to assess and score published characters used for distinguishing species of Neotoma. Although evaluation of characters is not yet complete, several problems with the current approach to identifying the teeth of Neotoma to species have become apparent. Characters are heavily influenced by the state of wear of teeth, contributing to the possibility that variation within a single species (owing to differential wear of teeth of individuals at different stages of ontogeny) may overwhelm purported variation between species. Small sample sizes are unlikely to capture the full range of variation within a species and are likely to yield misleading results regarding the ability to discriminate amongst species. Those problems will be exemplified using two published characters for distinguishing species of Neotoma.

PLASTISPHERE FRESHWATER MIGRATION: THE SPATIOTEMPORAL REMOBILIZATION OF MICROPLASTICS ACROSS TWO IRES WATERSHEDS.

AUTHORS

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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. To date, 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 the monitoring timeframe (n = 8451). Fibers were the most abundant (~89%) morphology followed by foams (8%). The abundance of microplastics varied in water and sediment samples from 2 to 320 items/cm^3 and 0 to 593 items/kg^{-1}, respectively. Potential MPs were marked and analyzed using Fourier Transform Infrared Spectroscopy (FTIR) for confirmation and polymer identification. Microplastic assemblages collected from water and sediment differed significantly and showed differences in their spatiotemporal patterns. This study is the first to monitor and report microplastics in ephemeral streams. The global extent of IRES systems is projected to increase with continued climate change; therefore, understanding how hydrodynamic patterns influence microplastic spatial distribution, remobilization, 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.

PLAYA DYNAMICS AND SALINITY: A STUDY OF YELLOW LAKE ON THE HIGH PLAINS OF TEXAS

AUTHORS

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ABSTRACT

Saline playas on the Southern High Plains are almost always located on large cattle ranches but they are of limited value to the herds of cattle grazing around their outer margins. Saline playas are often without water for extended periods and, after inundation, they experience considerable evaporative loss leading to hypersaline conditions. The primary goal of this study was to develop a quantitative method that combines the transitory nature of playa lakes and the variability of salinity into a set of parameters that can be used to compare playas or other surface water sources. Regarding water quality, a variable was developed that describes the fraction of observations with salinity levels below the salt tolerance threshold for cattle. With regard to water availability, water depth measurements were used to compute the fraction of time that a playa contains water. These two variables are combined to form a new variable that represents the fraction of time that water is both available and of acceptable quality. To demonstrate the utility of this method, data was collected at Yellow Lake, a large saline playa located on the Yellow House Ranch northwest of Lubbock, Texas. Results suggest that the playa contained water 50.8% of the time over a five-year period but the fraction of water samples with acceptable salinity was only 6.5%. The resulting fraction of time that water was both available and of acceptable quality was only 3.3%. This technique could be used to compare other ephemeral surface water sources in the region.

QUANTIFICATION OF BIODIESEL MIXTURES FROM HICKORY KERNEL OIL

AUTHORS

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ABSTRACT

Biodiesels are mixtures of fatty acid methyl esters (FAMEs) that can be produced from a variety of different feedstocks. The focus of this study was to characterize the FAME composition of biodiesels derived from hickory kernel oils (HKOs). Hickory nuts are potentially interesting sources for biodiesel fuels. Hickory nuts contain, on average, 60% fat by mass, and are not a common food source for humans. Shellbark hickory (Carya laciniosa) and mockernut hickory (Carya tomentosa) were used in this study. HKO was extracted from pulverized endosperm material. The HKO was then subjected to base-catalyzed transesterification using methanol. The FAME profile of the reaction product mixtures were then analyzed using GC-MS. Methyl elaidate and methyl linoleate were shown to make up the greatest concentration of both FAME mixtures, based on integration of the GC data. Methyl elaidate and methyl linoleate were present in a 5:3 ratio, respectively. The fact that methyl elaidate was the most abundant of the FAME products is important as this is the trans-isomer to a common cis-unsaturated FAME, methyl oleate, which is present in relatively low concentration. Cis mono- and polyunsaturated FAMEs typically have decreased oxidative stability. An abundance of trans- unsaturated FAMEs could have increased oxidative stability relative to the corresponding cis-unsaturated FAMEs. As more FAME profiles are determined, this pattern will be studied using HKO made from different Carya species.

QUANTITATIVE TRAIT LOCUS ANALYSIS TO IDENTIFY GENES ASSOCIATED WITH FOUR PARAMETERS OF LOCOMOTIVE CONTROLLED ACTIVITIES IN DROSOPHILA SIMULANS, DROSOPHILA SECHELLIA, AND THEIR INTERSPECIES LINES.

AUTHORS

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ABSTRACT

Two sister Drosophila species, simulans and sechellia, exhibit different 24-hour circadian-controlled locomotive activities, controlled by external stimuli such as light and internal mechanisms such as their gene and neural networks. We hypothesized that if we generate the varying locomotive phenotypes of these lines, combined with gene sequencing, we should be able to identify the genetic loci associated with our targeted phenotype traits of locomotion with the use of a quantitative trait locus analysis. A quantitative trait locus (QTL) is a statistical method that links two types of information—phenotypic data and genotypic data—to explain the genetic basis of variation in complex traits (Miles and Wayne, 2008). We sequenced the DNA from over 100 interspecies lines and have used a Drosophila Activity Monitor (DAM) to gather data on the circadian controlled locomotive activity of each. We characterized four parameters of the rhythmic locomotion profiles, including day activity, night activity, day anticipation and night anticipation. We then processed our data and used hundreds of different genetic markers for the smoothing process to prepare it for the QTL analysis. Our preliminary QTL analysis showed promising peaks from our initial analysis. We plan to screen more lines to increase the statistical power of our data and determine if those peaks may be statistically significant.

References

Miles, C. & Wayne, M. (2008) Quantitative trait locus (QTL) analysis. Nature Education 1(1):208

READILY AVAILABLE MARKET NONI JUICE DOES NOT EVOKE AN EQUIVALENT AVERSIVE RESPONSE IN DROSOPHILA SIMULANS WHEN COMPARED TO NONI FRUIT IN THE WILD

AUTHORS

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ABSTRACT

The Drosophila melanogaster subgroup of species is often utilized as a genetic model organism due to its short generation time, large number of offspring, and relatively cheap maintenance cost. Two species within this subgroup – Drosophila simulans and Drosophila sechellia -– exhibit different exploratory behaviors in an open field arena, possibly due to their different geographic locations and nutritional profiles in the wild. D. simulans is a high exploration, polyphagous species; D. sechellia is a low exploration, monophagous species, feeding and ovipositing exclusively on the Morinda citrifolia ("noni") fruit which is toxic to D. simulans. Since noni fruit is toxic to D. simulans in the wild, the assumption has been that noni juice used in laboratory settings would be equivalent to the noni fruit. Here we show that standard market noni juice does not function as an equal substitute for noni fruit in the wild. When performing a three-hour, quantified choice assay between simple sucrose solution and noni juice of equal caloric value, we found that D. simulans exhibits a slight preference for sucrose (compared to D. sechellia), but a much less marked preference against the noni than expected as well as no statistically significant uptick in death rates upon exposure to noni juice. This has implications for designing behavioral assays exploiting differential preferences for noni juice and sucrose in D. sechellia and D. simulans.

RELATIONSHIPS AMONG FUNCTIONAL LEAF TRAITS IN MULTIPLE GRASS SPECIES ACCOUNTING FOR PHYLOGENETIC RELATEDNESS

AUTHORS

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ABSTRACT

Functional traits are characteristics that strongly influence growth, reproduction or survival of plants. Functional traits related to drought resistance have received more research attention as climate change increases areas experiencing drought. We investigated the relationships among a suite of traits associated with drought resistance. We hypothesized that minimum leaf conductance would be associated with functional traits such as stomatal density, guard cell length, leaf width, or leaf mass per area. These functional traits were measured for multiple grass species by undergraduate students enrolled in an ecology course implemented as a course-based undergraduate research experience (CURE) at University of Houston-Downtown. Grasses were sampled from undeveloped land in Houston, Texas. Once phylogenetic relatedness was taken into account, leaf mass per area increased with increasing stomatal density on the abaxial side of the leaf, but not with the stomatal density on the adaxial side of the leaf. Other functional traits such as leaf width, stomatal density, guard cell length, and minimum leaf conductance were not strongly associated with each other. We have sampled exclusively in a single mesic community so far. Expanding our sampling to include species from more arid region areas might increase the breadth of variation in functional traits and potentially reveal the relationships among them.

RELEVANCE OF THREE-DIMENSIONAL INORGANIC COORDINATION NETWORKS AS POTENTIAL NUCLEAR WASTE MATRICES

AUTHORS

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ABSTRACT

The chemical similarities between trivalent lanthanide elements and their transuranium counterparts allow to utilize the lanthanides as surrogates for their actinide equivalents. The similarities between ionic radii of trivalent lanthanides and transuranium actinides permitted this to become common methodology when planning experiments with highly radioactive actinide elements. Experimental conditions are first fine-tuned with the lanthanide elements. Once synthetic protocols are well established replicating the synthesis with the actinide elements often leads to the creation of the targeted actinide compounds. Our recent endeavors of creating coordination networks with trivalent plutonium resulted in a purely inorganic plutonium compound. It formed diamond shaped crystals, which were twinned on multiple levels. The X-ray crystallographic data collected did not permit for the elucidation of the compound's structure. It was deduced that the twinned crystal incorporated purely inorganic entities such as potassium, sodium, and sulfate ions. Our efforts resulted in a purely inorganic praseodymium compound, $K_5NaPr_2(SO_4)_6$. This compound fits into a series of similar lanthanide compounds that have been previously reported. By adjusting and simplifying our synthetic procedures, we hope to find a feasible pathway to replicate and fully characterize said plutonium compound.

RESEARCH PROPOSAL AS AN EFFECTIVE ASSESSMENT IN AN UPPER-LEVEL BIOLOGY ELECTIVE COURSE

AUTHORS

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ABSTRACT

Upper-level elective courses in the major hold a special place in the Biology degree as these are the courses students elect to take to fulfill their interests and prepare them for their future careers. However, it can be challenging to develop appropriate senior-level assessments in these courses that both challenge and excite the students. Here, I will be sharing my experiences in developing and using research proposal as a major assessment in the Biology major elective course, Regenerative Medicine. This course introduces students into use of stem cells and scaffolds to aid tissue regeneration. In the course, students start with learning the basics of tissue regeneration and stem cells with assessments consisting of quizzes, problems, and exams containing free-response questions. Almost the whole latter half of the course is devoted to Nobel prize winning primary scientific articles in regenerative medicine. Students read the articles before class and complete the assessment before class discussion of the work. This prepares students for the writing of a novel research proposal in regenerative medicine. The research proposal mimics grant style including strict text limits and a specific format. Students are given instructions and an example proposal to aid in their own literature research and writing process. After submission of the proposal, students present their proposals to the whole class and moderate classroom discussions. Students have generated fascinating research proposals and presentations and the response from the students has been very positive and encouraging.

ROBOTIC ARMS REQUIREMENT STUDY TO SIMULATE HUMAN KNEE JOINT KINEMATICS ON AN ELASTIC FOAM

AUTHORS

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ABSTRACT

The Anterior Cruciate Ligament (ACL) is an intricate bundle of tissues located in the knee joint of humans. One of the internal factors that increases the risk of ACL injury is the tibial eminence, which refers to the protruding bony section of the tibia. Effectively assessing the impact of tibial prominence on ACL straining from a biomechanical standpoint is challenging. Utilizing the inverse kinematics methodology, a Baxter robot, equipped with two robotic arms, provides support and simulates the movement of an elastic foam. Here, the elastic foam is being used instead of the human knee joint to facilitate the conceptual study. The Baxter robot's robotic arms move two ends of an elastic foam, assuming that one end is the tibia, and the other end is the femur of a human knee joint. Two robotic arms interacted with each other to apply tension, compression, and twisting forces on an elastic foam material. A Differential Variable Reluctance Transducer senses the elastic foam straining generated in each motion. The entire project is under investigation to assess the specific requirements of a new prospective robot, such as the design of the end effector, the required speed of the robotic arm, and the necessary force to be exerted on the knee joint to simulate authentic sporting kinematic data.

STREAMLINING WORKFLOWS AND GENERATING INTERACTIVE RISK MAPS FOR MOSQUITO BORNE DISEASES IN CONNECTICUT, USA.

AUTHORS
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ABSTRACT
In 1999 West Nile Virus (WNV) was first discovered in America, and since then, mosquito surveillance has become the gold standard for monitoring epidemic and epizootic transmission. Despite the prevalence and importance of WNV surveillance programs in the US, there remains critical gaps to communicating risk of WNV, and many other mosquito-borne diseases, to the public, particularly when creating risk maps. To address this common limitation of mosquito surveillance programs, we synthesized results from a series of published investigations using The Connecticut Agricultural Experiment Station (CAES) mosquito and arbovirus surveillance system. We utilized this information from the CAES and made use of a mapping program that is interactive, web-based, and user friendly. Utilizing R, we can rapidly create visual displays of up to 9 mosquito-borne viruses across Connecticut over any chosen timeframe. These visual displays are projected onto a map, and each site has a built-in, interactive table with site-specific data relevant to the public. Sites testing positive are additionally highlighted with a 5km red buffer that communicates the estimated spatial extent of risk surrounding a positive site. While these maps create a targeted view of epidemic risk for public use, more studies are needed to assess how communities understand and utilize risk maps of mosquito borne diseases.

STRUCTURE OF A PLANT-POLLINATOR NETWORK AT AN URBAN WETLAND PRESERVE IN MIDLAND, TEXAS

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ABSTRACT
Species interaction network approaches have been a major focus of research in ecology and have potential to inform conservation efforts. Many recent studies have underscored the importance of conserving native plant and pollinator populations for their benefits to biodiversity, conservation, and agriculture. However, few studies have focused on the interactions of native and introduced plant species with native and introduced pollinators in ecological networks, especially in Texas. This study investigates the plant-pollinator network of the seasonal wetland of the I-20 Wildlife Preserve in Midland, Texas. Our study focuses on whether introduced insects and plants are connected, and whether they are connected to native species within the network of plant-pollinator interactions. In weekly observations, insect interactions with all flowering plants were recorded. Insect specimens were caught to be pinned and identified. We collected approximately 500 insect specimens of over 50 species, observed 70 plant species, and over 1,650 plant-pollinator interactions. By gathering these data, we will assemble a network of plant-pollinator interactions and analyze its structure using the R programming language. Through preliminary examination of the results, we observed evidence of introduced-native interactions. Tamarix, an introduced plant species, was found to be a pollinator hub for various native insect pollinators. These initial observations imply the presence of an interconnected network of introduced and native interactions. Our research will provide baseline information on ecosystems in a part of Texas where little ecological research has historically been conducted, becoming a resource to inform the conservation of native plant and pollinator biodiversity in Texas.

STRUCTURE OF EXTRAFLORAL NECTARIES IN CACTACEAE

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ABSTRACT

Extrafloral nectaries (EFNs) are specialized glands that secrete an aqueous solution of sugars and amino acids. Unlike floral nectaries, which function primarily in pollination, EFNs are typically associated with plant defense, attracting invertebrates whose presence and activity can reduce herbivory. EFNs have been reported from four fern families and 108 families of angiosperms, primarily monocots and eudicots; they are absent from the gymnosperms.
EFNs were first observed in cacti in 1837 and have been noted in at least 25 different genera. Morphologically, cactus EFNs have been categorized as belonging to one of four distinct groups: short, obviously modified spines (type 1 EFNs); nectaries that resemble ordinary spines with no readily apparent modifications (type 2 EFNs); nectaries associated with small foliage leaves occurring adjacent to an areole (type 3 EFNs); and nectar-secreting regions of epidermis situated below an areole (type 4 EFNs). Although the distribution of these morphological types has been examined, little is known of their structure.
Our studies have shown that type 1 EFNs are typically short, blunt projections consisting of a basal vascularized stalk and broad secretory head containing layers of nectary parenchyma and subnectary parenchyma and secretion appears to be through the cuticular covering of the gland. In type 2 EFNs, nectar is produced in an area of small, isodiametric cells with dense cytoplasm at the base of a spine, then transported upwards to the sites of secretion. In type 3 and type 4 EFNs, nectar is secreted through open stomata onto the surface of the epidermis.

STUDENT OUTCOMES AFTER PARTICIPATION IN UNDERGRADUATE RESEARCH EXPERIENCES IN NANO-ENABLED AGRICULTURE.

AUTHORS

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ABSTRACT

Western New Mexico University (WNMU) a rural, Hispanic-serving institution received an award from the National Institute of Food and Agriculture to support undergraduate research experiences in agriculture. The program offered real-world agriculture research projects to undergraduate students with the goal of promoting pathways to careers and advanced studies in agriculture. The overarching goal of the research component was the evaluation of different formulations and doses of nanomaterials to enhance crop production in native soils from New Mexico in comparison with traditional agrochemicals. The goal of the education component was to offer a research-based experiential learning pedagogy designed to increase student engagement. The program provided 24 stipends that supported 13 WNMU students throughout the duration of the award, and 16 undergraduate students participated as collaborators at Houston Christian University (HCU). At the end of the project, students completed the undergraduate research student self-assessment (URSSA). Results showed overall positive gains in learning, research skills, research mindset, career choices, and engagement among participating students.

STUDY OF THE FORCES AROUND THE KNEE DURING A LATERAL JUMP IN FEMALE ATHLETES

AUTHORS

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ABSTRACT

Anterior Cruciate Ligament (ACL) injuries occur when the ligament, which helps stabilize and control movement, is damaged or torn. These injuries often result from non-contact incidents, such as pivoting or landing awkwardly, and can lead to pain, swelling, and instability in the knee, requiring surgical intervention and rehabilitation to restore the knee and prevent long-term joint damage. An accurate analysis of the forces induced during extensive physical activity is needed to further biomechanical knowledge for the knee and surrounding ligaments. Here we show the average impulse force exerted by a female athlete is approximately 320 Ns, while the average rate of force was 2224 N/s. These values give an accurate baseline for the forces present around the knee and can lead to more accurate testing for synthetic ACL replacements for injured women. By quantifying these results for biomechanical research this data could also contribute to a deeper understanding of human movement, advancing sports science, orthopedics, and rehabilitation.

SYNTHESIS AND EVALUATION OF CARBAMATE BIOCONJUGATES FOR HEPATOCYTE TRANSPLANTATION

AUTHORS

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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 has 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 a reversible alternative to the amide bioconjugates found in our previous designs. This presentation will report the successful modification of pericardium tissue and isolated hepatocyte cells utilizing carbamate bioconjugates prepared using a mixed carbonate linker. We will also report on the relative stability of carbamate and amide bioconjugates to soluble proteins and cells, as well as the viability of differently modified cells. These experiments have demonstrated that carbamate bioconjugates can be used to modify hepatocytes with a stability comparable to amide bioconjugates, and indicate the potential for carbamate-based reversible cell modification strategies for hepatocyte transplantation.

SYNTHESIZING FRAMEWORKS TO CATCH FISSION FRAGMENT

AUTHORS

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ABSTRACT

By: Victoriano Cooper, and Diego Zometa
The Nuclear Energy eXperimental Testing Laboratory (NEXT Lab) seeks to provide global solutions to the world's most critical needs: clean energy, access to clean water, and access to useful radio medicine. In order to do so, the NEXT Lab is assembling a fluoride molten salt research reactor. The Isotope Extraction and Purification (IEP) team is developing chemical methods to extract, identify, and purify useful fission products of uranium-235 found in the molten salt. These radioisotopes will be studied and extracted from gaseous, solid, and molten salt samples. These isotopes will be extracted with microporous materials such as graphene oxide (GO), metal organic frameworks (MOFs), and sponge/MOF composites. The GO was synthesized from graphite powder. The MOFs synthesized include ZIF-4 and Co-ZIF-4 which are both resistant to elevated temperatures. The sponge/MOF composites are novel materials based on ZIF-4 and ZIF-8. Their production methods improve on a previously known technique. The composite is hydrophobic and capable of separating organic solutions from water. The characterization techniques used include the scanning electron microscope (SEM), differential scanning calorimeter (DSC), the FTIR, and the X-ray diffractometer. The sponge MOF is characterized by gravimetry, testing buoyancy on water, and using an organic-aqueous separation test.
Keywords: Molten Salt Research Reactor, Isotope Extraction, Metal Organic Frameworks, Graphene Oxide, Metal Organic Framework Derivatives, Fission Fragments

TARDIGRADES ON QUERCUS VIRGINIANA: A DISTRIBUTION ANALYSIS

AUTHORS

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ABSTRACT

Tardigrades are aquatic microinvertebrates of the Ecdysozoa clade. Found in every biome on earth, they are best known for their ability to survive extreme environmental conditions via cryptobiosis. Quercus virginiana, the Southern Live Oak, features long sprawling branches that offer collection points for tardigrades transmitted on the winds or hitching rides on the feathers and feet of birds. Research to explain why or how these species exist within their preferred microhabitats is lacking, and we seek to contribute to defining the distribution, density, and diversity of tardigrade populations of epiphytic moss found on Quercus Virginiana. **Here we show** the distribution of tardigrades found on Quercus Virginiana was greatly increased in the epiphytic moss of the branches, with increasing height from the ground and distance from the tree center. Branches were more heavily populated and there was a greater species richness moving from the tree center outward. We demonstrated that four tree features drive significant variation in both relative density and species richness, and that neither the trees, or their interaction with features, explained the significant variation for relative density or species richness. Sample relative density positively correlated with species richness. Mean relative density was not significantly different among most feature type and mean species richness in branches was significantly greater than in the crotches. Of 60 moss samples, 321 tardigrades and six eggs were found representing six species belonging to four genera of the tardigrade super-family Macrobiotidae. Most intriguing was the discovery of Macrobiotus evelinae, the first in North America.

TELLING A SNAIL'S TALE: ASSESSMENT OF EDNA ANALYSIS AS A TOOL TO MONITOR REMOVAL EFFORTS OF POMACEA MACULATA IN SOUTH AUSTIN.

AUTHORS

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ABSTRACT

To battle non-native species, conservationists increasingly rely on environmental DNA (eDNA)— genetic material shed by organisms in the form of cells and other wastes— for quick and sensitive species detection. The non-native invasive species, Pomacea maculata, commonly known as an apple snail, recently expanded its range from Houston to San Antonio. In 2019, P. maculata also established in a small pond, Bear Lake, in South Austin. We investigated how to monitor the population size of an invasive species using eDNA and ongoing removal efforts. Our goal is to ascertain when local extirpation really occurs. Removal efforts from Bear Lake provide a case study of how eDNA monitoring may aid in the management of apple snail invasion. Since 2020, concerned neighbors removed 4,942 snails by hand and eliminated 1,734 egg clutches from the six-acre retention pond. In October 2021, we began collecting surface water samples monthly for eDNA analysis as visual surveys still found snails on occasion. Without intervention, the high reproductive capacity of P. maculata could re-establish the population in the pond, but ongoing efforts including homeowner hand removal, eDNA monitoring, and a cold winter freeze have kept their population numbers low. Despite such intense efforts, especially in 2020 (with an estimated 99% of snails removed), visual and eDNA monitoring efforts indicate a persistent population. This talk examines the monthly trends in snail and egg-clutch abundance, as well as the relationship between visual observations and eDNA sampling to recommend a plan for preventing a resurgence in the population.

TEMPERATURE REMEDIATION EFFECTIVENESS OF BIORETENTION BASINS ON THE UNIVERSITY OF TEXAS AT SAN ANTONIO CAMPUS

AUTHORS

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ABSTRACT

Urban development replaces vegetated landscapes with impervious cover, which leads to increased stormwater runoff, higher flood peaks, and reduced water quality. Green stormwater infrastructure such as bioretention basins has been used successfully to mitigate hydrologic and water quality impacts of impervious cover in small watersheds. Impervious cover can also increase air temperatures through heat island effects and cause temperature spikes during stormwater runoff in rivers and streams. Green stormwater infrastructure might reduce such temperature impacts downstream, but impacts on temperature have been less well studied. We investigated the ability of bioretention basins to reduce temperature spikes in stormwater runoff by deploying temperature loggers in the inflow and outflow of several basins on the University of Texas at San Antonio campus. We compared temperature changes during stormwater runoff in the inflow and outflow and also compared water temperatures to air temperature. We found temperature spikes of 2 degrees C on average in inflow stormwater runoff, but more consistent temperature of water released from basins. In warm months, outflow temperatures were significantly colder than inflow temperatures, but in cold months, outflow temperatures were warmer than inflow temperatures. Mitigation of temperature spikes and release of water with consistent temperatures throughout the year shows that bioretention basins recover natural hydrologic processes wherein water moves slowly through soils and is released downstream, similar to groundwater inputs. Thus, green stormwater infrastructure may be helpful in mitigating urban heat island effects in addition to addressing hydrologic and water quality issues of urban development.

TEXAS EXPERIENTIAL LEARNING AND SCHOLARSHIP PROGRAM FOR FOOD AND AGRICULTURAL SCIENCE TRAINING PROGRAM (TEXAS FAST) – YEAR 1

AUTHORS

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ABSTRACT

TExAS FAST is a five-year, $5 million grant funded by the NextGen program via the U.S. Department of Agriculture, National Institute of Food and Agriculture. Our Lady of the Lake University (OLLU) will prepare undergraduate students in the new, interdisciplinary Environmental Science and Sustainability degree program for careers in food, agriculture, natural resources, and human sciences (FANH) via applications of learned experiences through equity-driven teaching, mentoring, and outreach processes. Located in San Antonio, with an undergraduate population of 1,195 (73% Latinx, 41% first-generation, 55 % Pell-eligible) and with expertise in culturally relevant pedagogy, curriculum, and student support, OLLU is uniquely positioned to diversify the future FANH workforce. TExAS FAST aims to build and sustain the next generation of FANH workforce by 1) eliminating barriers to retention and graduation by providing scholarships, mentoring, multiple research experiences, and a living learning community and by 2) expanding career awareness across diverse FANH sectors and increasing employability skills through meaningful experiential learning opportunities and paid internships. TExAS FAST will create programming that nurtures engagement with natural resources and fosters interest in FANH careers. Students will develop the research, leadership, and employability skills necessary for high-demand FANH occupations.

THE DEEP LEARNING APPROACH TO UAV SAFETY

AUTHORS

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ABSTRACT

Considering recent developments in UAV/UAS systems paired with continued advancements in accuracy of deep learning models there comes an interesting blend of hardware and software integration. These interactions between AI, namely deep learning models and real or near-time data from UAV hardware can be key in developing and implementing features across UAV platforms. This presentation will explore the development of a safety system for takeoff and landing UAV platforms utilizing CNN-based deep learning models and traditional computer vision tasks. With both flight and landing condition data captured from UAV systems across different proposed scenarios (surfaces, and obstructions), deep learning algorithms were trained and implemented to scrutinize the safety of flight operation/conditions during takeoff and landing. The result of implementing these deep learning models was the ability to use various outputs in the form of safety suggestions (clear, moderate obstruction, and unsafe) in order to suggest precautions for the piloting and operation of UAV systems. These safety metrics are evaluated by the accuracy of the models' detection and segmentation of areas of interest, in particular confidence thresholds and accuracy scoring for the overall model. The operator can utilize the suggestions and outputs of the models in order to better understand vehicle obstructions, scrutinize landing conditions, as well as understand further flight operation. From this exercise the implications and usage of CNN-based deep learning methods, safe flight operations, and human code interaction can be better understood.

THE EFFECT OF CONCENTRATION AND FLOW RATE OF POLYCAPROLACTONE SOLUTION ON THE TENSILE MECHANICAL PROPERTIES FOR ELECTROSPUN PCL FIBERS AT 14 KV

AUTHORS

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ABSTRACT

This study presents a comprehensive analysis of the tensile properties of electrospun polycaprolactone (PCL) fibers, aiming to deepen the understanding of their tensile loading behavior for potential applications in biomedical engineering and materials science. We conducted tensile tests on PCL fibers at a 5 mm/min tensile loading rate, making two sets of samples. The first set contains 36 samples and was made out of a 1mL/min flow rate of PCL solution, whereas the second set contains 36 samples and was made out of a 2mL/min flow rate of PCL solution. All 72 samples' thickness from both set was 4 μm ± 7%, maintaining the voltage of 14 kV between the syringe needles and the collector. The samples from each set are divided into six groups, maintaining weight concentrations 5%, 8%, 12%, 14%, 16%, and 18%, whereas the solvent is acetone. The mean value of Young's modulus for the first set was 3.9 ± 0.7 MPa, the average value of strain at break was 170 ± 10%, and Young's modulus for the second set was 3.2 ± 0.8 MPa, and the average value of strain at break was 110 ± 10%.

THE EFFECT OF SODIUM BUTYRATE ON PA28Γ IN TRIPLE-NEGATIVE BREAST CANCER CELLS

AUTHORS

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ABSTRACT

PA28γ is an ATP and ubiquitin independent proteasome activator that is overexpressed in many cancers. Sodium Butyrate (NaBt) treatment can reduce PA28γ protein levels, but the mechanism for reducing PA28γ expression is unknown. Previous work in our lab demonstrated that NaBt reduces PA28γ protein concentration in 4T1 cells (mouse mammary carcinoma) in a dose and time dependent manner. However, qPCR has shown PA28γ mRNA levels remained constant, indicating NaBt is not affecting mRNA synthesis, suggesting NaBt is impacting the expression of PA28γ at the translational level. Additionally, when observing stability of PA28γ in 4T1 cells treated with butyrate, the half-life remained at 9 hours in treated and untreated cells. Thus, the goal of this project is to elucidate what occurs mechanistically prior or post-translation causing PA28γ to decrease following NaBt treatment. It was speculated that NaBt could increase ubiquitination of proteins. Yet, through Ubiquicapture assay and analysis through western blotting, there had been changes of ubiquitination of PA28γ with increasing doses of NaBt, indicating NaBt must be affecting PA28γexpression prior to translation. It has been noted that PA28γ is a novel target of microRNA-7 which binds to PA28γ mRNA to regulate expression, however microRNA-7 is downregulated in many cancers. When monitoring HOXD10, a known transcription factor of microRNA-7, in response to NaBt treatment western blotting revealed an increase of HOXD10 when 4T1 cells were treated with NaBt. Further observation of microRNA-7 in 4T1 cells treated with NaBt through qPCR is needed to elucidate if NaBt increases microRNA-7 expression.

THE EFFECTS OF INVASIVE FERAL HOG ON CHANNEL CONDITIONS AND BENTHIC MACROINVERTEBRATE COMMUNITIES IN THE SOUTH LLANO RIVER

AUTHORS

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ABSTRACT

Spring inputs enable the South Llano River (SLR) to maintain elevated baseflows even during periods of drought. As a result, this central Texas ecosystem supports high aquatic and terrestrial biodiversity and provides abundant natural contributions to people; however, multiple major threats challenge the sustained ecological integrity and water quality in the SLR. One critical threat is posed by invasive feral hogs (Sus scrofa), which are known to negatively affect the aquatic-terrestrial interface by trampling substrate and removing vegetation, drastically impairing the structure and function of the riparian zone. To examine the impacts of feral hogs on channel conditions and benthic macroinvertebrate communities in the SLR, we surveyed a 24-km stretch containing clean riffles ('control'; N=18) and riffles adjacent to hog wallows ('impacted'; N=25) for water quality (i.e., dissolved oxygen, conductivity, temperature, chlorophyll A, turbidity, and dissolved nitrogen/phosphorous), structural components (i.e., wallow area, streambank slope, riffle area, thalweg and average depth, presence of prominent habitat features, and dominant substrate), and benthic macroinvertebrates. We observed alterations in water quality and riffle structure resulting from the presence of hog wallows; structural changes to the SLR have caused a shift in the benthic macroinvertebrate community to include a higher abundance of generalist species that can tolerate poor water quality. This work demonstrates linkages between aquatic and terrestrial ecosystems and the large-scale effects invasive species can have across this gradient, and our work represents a call to action for increased invasive species management and the protection of critical habitats in central Texas.

THE ENDERSTRUDER: AN ACCESSIBLE OPEN-SOURCE SYRINGE EXTRUDER COMPATIBLE WITH ENDER SERIES 3D PRINTERS

AUTHORS

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ABSTRACT

Bioprinting enabled the precise spatiotemporal deposition of cell-containing bioinks, opening new avenues of research in tissue engineering and regenerative medicine. However, the widespread adoption of bioprinting technology is hindered by the high cost of commercial bioprinters and an expanding closed ecosystem, which has led to custom bioprinting modifications to 3D printers. Although several open-source extruder designs currently exist, only one extruder has been specifically adapted for the affordable open-source Ender series, a line of machines that are widely available. Here, we introduce the Enderstruder, a cost-effective extruder attachment that uses a standard 10 mL BD syringe, positions the stepper motor at gantry level, enhances x-axis stability with a linear rail, and uses the originally included stepper motor, resulting in simplified assembly. The Enderstruder consists of a 3D printed core, syringe carriage, and herringbone gears. Alongside the Enderstruder, we present a rigorous iterative process to fine-tune printing profiles for high-viscosity biomaterial inks. To help implement our work, we also provided fully editable Cura profiles for five commonly used biomaterials. We then employed the Enderstruder to print established calibration patterns as well as complex shapes using these bioinks. Printability assessments were conducted using ImageJ, focusing on analyzing the circularity value of pores in logpile lattices present in the calibration prints. We observed results that aligned with those in existing literature, validating the applicability of our design. In future iterations we will add a UV light and temperature control to handle photosensitive polymers that are viscous at room temperature

THE GRAND STAIRCASE-ESCALANTE NATIONAL MONUMENT AS A TOOL FOR UNDERGRADUATE RESEARCH

AUTHORS

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ABSTRACT

The Grand Staircase-Escalante National Monument is a sequence of sedimentary units in northern Arizona and southern Utah, located near the western margin of the Colorado Plateau. The layers range in age from 600 to 200 Ma and record the various depositional environments that existed in the southwestern U.S. during the late Paleozoic through the mid-Cenozoic eras. The monument consists of a series of topographic plateaus and cliffs that step progressively up in elevation. The cliffs named based on their outcrop characteristics and color; from the south they are the Chocolate Cliffs, Vermillion Cliffs, White Cliffs, Gray

Cliffs, and the uppermost Pink Cliffs. Within each plateau and cliff section, many of the more well-known southwestern U.S. formations crop out and contribute to the colorful display. In August 2023, hand samples and sediments from each of the formations within the Grand Staircase-Escalante National Monument were collected from permitted locations. These sediments are now being used as a series of undergraduate research projects, with students focusing on single formations or a series of formations to better understand the depositional environments and unique characteristics of these units. These projects allow students to develop foundational research skills including literature review, rock and mineral descriptions, sediment size analysis, and elemental analysis using x-ray fluorescence. Each of the units will be stored in glass jars as part of an eventual Grand Staircase-Escalante National Monument display in the Department of Earth Sciences and Geologic Resources at Stephen F. Austin State University.

THE LOGISTICS OF TURNING A DREAM INTO REALITY

AUTHORS

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ABSTRACT

With the honor and privilege of receiving a postdoctoral appointment at the Los Alamos National Laboratory (LANL) in 2003, I discovered my passion for the f-elements. As part of my postdoctoral research project, I began working with the non-radioactive lanthanide elements as well as depleted uranium. I was hoping to make contributions to the advanced nuclear fuel cycle and the improvement of nuclear waste storage solutions. Observing some of the world's foremost nuclear scientists work with the highly radioactive transuranium elements awakened my desire to do exactly that. Almost 20 years later I was presented with the opportunity to work with plutonium. This presentation will showcase to young members of the scientific community how patience, perseverance, networking, and the indestructible faith that relying on others will enable one to realize one's dreams.

THE MORPHOLOGY OF CRANIAL BALLISTIC TRAUMA: TWELVE CASE STUDIES

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ABSTRACT

Bone fractures resulting from ballistic trauma can provide potential evidence of the mechanism of injury or death. Additionally, the morphology of these fractures may lend information about the type of weapon, the trajectory of impact, and the direction of fire. Biomechanical properties of the cranium can influence trauma patterning of these fractures due to features such as cranial buttresses and suture lines. This study examined cranial fracture patterns resulting from gunshot wounds along the sagittal and coronal planes on twelve donated remains housed in the Southeast Texas Applied Forensic Science facility and the Forensic Anthropology Center at Texas State. For each donor, the presence and distribution of ectocranial fractures, missing bony segments, and entrance/exit wound morphology were analyzed and compared. The results showed that radiating fractures ran parallel to the buttressed areas of the cranial vault in both planes. However, in wounds inflicted along the sagittal plane, these fractures ran perpendicular to the buttressed areas of the splanchnocranium. Diastatic fractures of the zygomaticotemporal suture and orbital damage were consistently observed in both wound trajectories. The weakness of the zygomaticotemporal suture, attributed to the malar eminence buttress's strength, and the vulnerability of the thin-walled orbital elements, particularly the sphenoid, are key factors in determining fracture morphology. This study's findings enhance our ability to reconstruct trauma histories of crania with suspected ballistic trauma. Understanding these specific fracture patterns may aid in determining the trajectory and mechanism of gunshot wounds, which can be pivotal in forensic investigations.

THE OCCURRENCE OF MICROPLASTICS WITHIN DIFFERENTLY AGED FOREST STANDS

AUTHORS

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ABSTRACT

Plant communities of old-growth and new-growth forests are influenced by soil characteristics which can be altered by land use management practices and anthropogenic pollutants. Microplastic pollution has been reported to be ubiquitous across terrestrial ecosystems and has accumulated over decades of discardment and slow degradation, but our understanding of stand growth and microplastic soil deposition profiles is limited. This study examines the occurrence of microplastics within differently aged forests to better understand the correlation between forest age and microplastic concentration. We sampled 4 differently aged forest stands in the Pisgah National Forest. A total of 40 soil core samples from the top 38.1 cm (15 in) of soil were collected over 5 weeks during the summer of 2023. Each soil core was divided into 3 sections to clearly identify where

microplastic levels were highest within the soil core. Results regarding soil profiles and microplastic concentration across 4 different forest stands are currently being processed. Characteristics, identification, and impacts can be reported during presentation. Differently aged forests have a unique and essential role in species diversity, carbon sequestration, soil composition, and wildlife habitat. Understanding the amount of microplastics within the soil of differently aged stands will aid in our understanding of environmental health and security.

THE SIGNIFICANCE OF GLUCOSE CONCENTRATION ON BACTERIAL BIOFILM FORMATION

AUTHORS

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ABSTRACT

Biofilms are clusters of microbial cells, encased in a self-produced polymer matrix that plays a pivotal role in providing both nutrients and a stable microenvironment for bacteria. This matrix significantly influences bacterial virulence and contributes to antibiotic resistance. Conditions such as diabetes mellitus and hyperglycemia were recently linked to post-operative infection. Both of these conditions are associated with elevated glucose levels in blood due to a disorder in the glucose metabolism. Based on studies conducted on Pseudomonas aeruginosa [1], we hypothesize that chances of severe microbial infections are higher in those individuals with glucose metabolism disorder, which is related to drug resistant biofilm formation. Hence we initiated the study to check the influence of glucose concentration on the biofilm formation of Bacillus thuringiensis (Bt). The study was conducted using varying glucose concentrations of 0, 50, 100, and 150 mg/dL. The growth of the bacterial culture was assessed by measuring the optical density (OD) at 600 nm. The varying glucose concentrations were added to two 96-well plates containing 104 CFU/mL (colony forming unit, by checking OD and further dilution) and incubated for 24 and 48 hours respectively. Gram staining with crystal violet and microscopic imaging revealed increased biofilm density in proportion to prolonged incubation. Notably, an increase in biofilm formation was found to correspond to an increase in glucose formation. This study intends to extend its investigations to examine the effects of fructose and sucrose on biofilm formation.
[1] P. She, et al., MicrobiologyOpen, 8 (2019) e933.

THE STABILITY OF EPIGENETIC VARIANTS THAT CAN ACT AS LOCI CAUSING PHENOTYPIC CHANGE

AUTHORS

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ABSTRACT

Epigenetic variations are a possible source of heritable phenotypic variation. In this paper we study phenotypic alterations seen in epigenetic Recombinant Inbred Lines (epiRILs) of Arabidopsis thaliana. They allow us to study the effects differentially methylated regions (DMRs) have on phenotypic variance. In a study performed in 2014 by Cortijo et al., they found that DMR's affect flowering time and root length when grown under greenhouse conditions. In this study, we replicated the Cortijo et al. (2014) study, with some changes, to see whether the same significant eQTL regions are found. We found that, even after several years and many generations, some of the eQTLs that were found in the Cortijo et al. (2014) study overlapped with those in this study. While there were some discrepancies, this could be due to insufficient power to detect the eQTL regions that were missed, as well as differences in the experimental conditions between our study and theirs. The fact that we found any eQTLs at all suggests that the epigenotypes of the epiRILs are largely the same as when they were constructed. Otherwise, we would have found no significant eQTL regions at all. Overall, this work adds weight to the observation that methylation changes can be heritable and stable across generations, and that these changes can alter phenotypes -- all of the ingredients needed for evolution -- independent of any DNA sequence changes

THERE IS NO I IN REDOX: DESIGN PRINCIPLES FOR COOPERATIVITY IN REDOX PROCESSES

AUTHORS

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ABSTRACT

Multiple redox events are foundational to chemical processes. Most chemical processes are two-electron processes (resonance, organic arrow pushing mechanisms, and oxidative addition/reductive elimination in organometallic chemistry). Due to the prevalence of this two-electron process, platinum group metals are widely used in catalysis given that they often perform two-electron redox events. In nature, enzymes often pair Earth-abundant metals which undergo one-electron (radical) redox events to perform multi-electron chemistry. While prevalent in enzymes, the energetic, proximity, and geometric orientation requirements to allow this cooperativity are not well understood. 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. In an effort to better quantify

“close in energy”, this talk will discuss a new multi-reference computational technique MCSCF (multireference self-consistent field theory) to identify electronic communication between redox sites.

USING METAGENOMICS TO IDENTIFY COMAMMOX PATHWAY IN THE NOVEL PHYLUM EISENBACTERIA

AUTHORS

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ABSTRACT

Improvements in submersible technology have given researchers the ability to investigate extreme marine environments, which has opened the door for new discoveries in biology. The vast majority of the organisms that live in these conditions are microbes. Traditional culturing of extremophiles is difficult due to the practical issues of recreating the harsh conditions in which these microbes thrive. To aid in the understanding of life in extreme biomes, metagenomics has become the standard procedure for determining the microbes that live there and what metabolic pathways they possibly have. In this study a soil sample was collected from a cold seep in the Gulf of Mexico, and metagenomics with shotgun sequencing was used to determine the life forms present in the sample. From one sample there were eight different phyla bacteria observed. One phylum that was of particular interest in this sample was Eisenbacteria. The Eisenbacteria presented here contained genetic sequences that are known to code for the complete oxidative pathway of ammonia to nitrate (comammox). This is an exciting discovery as there is currently only one other bacterial genus (nitrospira, in the phylum nitrospirota). Finding new species that are capable of such novel metabolic pathways aid in developing a more complete picture of the nitrogen cycle that occurs in the world’s oceans.

USING PYGLPK TO SCHEDULE UNIVERSITY COURSE TIMES

AUTHORS

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ABSTRACT

Course scheduling at a university is a required task every semester, governed by numerous rules, but often has enough changing components that few semesters can be scheduled identically to the year before. For many department chairs and other administrators, it is a time-consuming task, one that is perhaps not fully appreciated from the outside. In most universities, there are constraints that do not change substantially from year to year, such as rooms, allowable course times, and known conflicts between courses. There are also components that may vary substantially, including instructor availability. When all of the requirements are stated, they can be represented via an integer linear program. Existing operations research techniques can either provide a solution or report that the set of constraints does not permit one. We develop a software tool (hard coding the fixed constraints, and reading in the others from human-readable CSV files, a possible export format for Google Sheets) that uses PyGLPK, a Python adaptation of the Gnu Linear Programming Kit to efficiently produce a CSV file with a feasible schedule, unless none exists. It is not uncommon that the first attempt at producing a schedule may satisfy the stated constraints but be viewed as undesirable to the people involved, thus leading them to be able to refine what were previously unstated constraints. We hope that this tool can reduce the time spent on schedule creation and potentially increase equity by removing hidden constraints.

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