The Oklahoma Louis Stokes Alliance for Minority Participation

29th Annual Research Symposium

September 23rd, 2023 * Wes Watkins Center, Oklahoma State University

A consortium of colleges and universities in Oklahoma seeking to improve the quantity and quality of students from underserved populations.

Promoting Student Success in STEM

OK-LSAMP IS FUNDED THROUGH NATIONAL SCIENCE FOUNDATION (NSF) GRANT #HRD-1911370
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Wi-fi Access: eduroam
Username: oklsamp_guest
Password: Symp2023

Keep us updated on your accomplishments throughout the year, so we can feature them on our website and social media! Email: oklsamp@okstate.edu
8:00 AM - 9:00 AM  Registration, Check-In & Poster Setup  Lobby, 1st Fl.
   / All Posters Must be Set Up by 9:00 AM

9:00 AM - 9:15 AM  WELCOME & OPENING REMARKS  Auditorium, 1st Fl.
   / Jason F. Kirksey, Ph.D., Principal Investigator, OK-LSAMP
   Vice President for Institutional Diversity, Oklahoma State University

9:15 AM - 10:30 AM  KEYNOTE ADDRESS: KEEP PUSHING FORWARD  Auditorium, 1st Fl.
   / Dr. Brandon Postoak, D.O.
   Emergency Medicine Physician & Member of the Chickasaw Nation
   Former OK-LSAMP Scholar

10:30 AM - 11:00 AM  Judges’ Orientation Meeting  Rm. 106

10:30 AM - 10:45 AM  Break

10:45 AM - 11:45 AM  POSTER PRESENTATIONS  Exhibit Hall East/112, 1st Fl.
   / All Presenters Must be by Their Posters

11:45 AM - 12:45 PM  Networking Lunch  Exhibit Hall West/111, 1st Fl.

12:45 PM - 2:20 PM  ORAL PRESENTATIONS
   / Engineering  Rm. 101
   / Biology  Rm. 108
   / Physics, Biology & Applied Sciences  Rm. 109
   / Chemistry, Biochemistry & Microbiology  Rm. 209
   / Natural Sciences  Rm. 308E

See “Presentations Listed Alphabetically” for Specific Times

Agenda continued on next page
12:45 PM - 2:00 PM  
**PRESENTATION: BEING DIVERSE IN STEM**  
*Navigating Academia, Imposter Syndrome & Careers*  
/ Dr. Cammi Valdez, Asst. Prof., Chemistry  
Research Member, Harold Hamm Diabetes Center, Dept. of Natural Sciences  
Northeastern State University; SWOSU/OK-LSAMP Alum  

2:00 PM - 2:20 PM  
**Networking Break**  

2:20 PM - 3:45 PM  
**PANEL SESSION: OK-LSAMP SCHOLAR EXPERIENCES**  
*International Research, Internships, Graduate School & the STEM Workforce*  
/ Moderator: Kaylie Keckler, Director, Orange Strides Project - TRIO Talent Search, OSU  
/ Iris Borunda, Mechanical Engineering, Sr., OSU; IRES Program - Vermont to Japan  
/ Kalen Todd Strunk, Microbiology & Molecular Biology; Biochemistry, Sr., OSU; REU - Univ. of Southern Calif.  
/ Ashtyn McAdoo, SWOSU/OK-LSAMP Alum; Graduate Student - Vanderibilit University  
/ Dr. Maria Castaneda, TU/OK-LSAMP Alum; Clinical Research Scientist - Loxo Oncology at Eli Lilly  

3:45 PM - 4:00 PM  
**AWARD PRESENTATIONS**  
/ Poster Presentations: 1st, 2nd, 3rd Place  
/ Oral Presentations: 1st, 2nd, 3rd Place  
/ Poster & Oral Presentations (*Presenter participated in both categories*): Grand Prize (1)  

4:00 PM  
**Adjourn**
## Rooms & Times as Designated Below

### Oral Presentations

*Spotlighting the Research of OK-LSAMP Scholars*

#### ENGINEERING - ROOM 101

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#### PHYSICS, BIOLOGY & APPLIED SCIENCES - ROOM 109

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Exhibit Hall East, 10:45 - 11:45 a.m.

Poster Presentations
Spotlighting the Research of OK-LSAMP Scholars

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**Poster Presentations**

*Spotlighting the Research of OK-LSAMP Scholars*

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Exhibitors

Visit Exhibitor Tables Throughout the Day

Expand Your Network!

- Oklahoma State University American Indian Science & Engineering Fair (NAISEF)
- Oklahoma State University Dept. of Design and Merchandising
- Oklahoma State University Dept. of Mechanical & Aerospace Engineering
- Oklahoma State University Dept. of Microbiology & Molecular Genetics
- Oklahoma State University Oklahoma Water Resources Center (OWRC)
- The University of Kansas Center for Environmentally Beneficial Catalysis
- The University of Oklahoma Graduate College
- University of Central Oklahoma School of Engineering
Keynote Speaker

Dr. Brandon Postoak is an Emergency Medicine Resident Physician at Integris Southwest Medical Center in Oklahoma City, Oklahoma. He graduated medical school from Oklahoma State University College of Osteopathic Medicine in 2022. Before medical school, he attended East Central University and obtained a Bachelor of Science degree in 2018. During his time at OSU-COM and ECU, he served in many roles to enhance the diversity of current and prospective students. These included serving as the Association of Native American Medical Students National President, the OSU Student Government Association Diversity Chair, and a member of the OK Louis Stokes Alliance for Minority Participation Program in which he tutored students in a variety of classes. Dr. Postoak is an enrolled member of the resilient and unconquerable Chickasaw Nation. He loves his people, culture, and other minorities. His passion includes helping minorities succeed in any way he can.
Dr. Cammi Valdez is a vascular biologist, faculty member, and champion of making STEM accessible. As a Latina woman scientist, she is a strong advocate for empowering and advancing women, first-generation students, and people of color in STEM. Dr. Valdez is currently an Assistant Professor of Chemistry at Northeastern State University. Beginning in 2015, she has served as a member of the Harvard Graduate School Alumni Council and in 2020 she became a trustee for the Southwestern Oklahoma State University Foundation. Previously, Dr. Valdez served as the President of the National McNair Association of Professionals, Director of the McNair Scholars Program at Wellesley College, and as Assistant Director of Research and Fellowships at Harvard College.

The Valdez Laboratory takes a four-pronged approach to studying Diabetic Retinopathy, the eye disease in diabetes: vascular research, tool developments, community needs, and STEM education. We are able to accomplish this through traditional lab benchwork with mouse models of disease, computational programming, and innovative approaches with 3D printing to connect with our community.

Dr. Valdez received a B.S. Professional in Chemistry and a B.S. in Mathematics from Southwestern Oklahoma State University, where she was an OK-LSAMP Scholar, and earned her Ph.D. in Biological Chemistry and Molecular Pharmacology from Harvard University. During graduate school, her scholarship and work were recognized with the NSF Graduate Research Fellowship, NASPA Massachusetts Richard F. Stevens Outstanding Graduate Student Award, 60th Nobel Laureate Meeting Harvard Ambassador, and serving as a Harvard GSAS Commencement Marshal. Her research in vascular biology has been published in numerous journals including The American Journal of Pathology as well as Current Diabetes Report.
Panel Session: 2:20 p.m. - 3:45 p.m.

OK-LSAMP Scholar Experiences
International Research, Internships, Graduate School & the STEM Workforce

Moderator: Kaylie Keckler is the Director of the TRIO Orange Strides: Talent Search program. She earned her Bachelor of Science degree in Psychology from the University of Central Missouri in 2015. Then in 2018, Kaylie received her Master of Science degree in Experimental Psychology from Oklahoma State University. Her research area has focused on prejudice and stereotypes. Kaylie is also a proud alumnus of the TRIO Ronald E. McNair Scholars program. She understands the unique challenges and circumstances that low-income first-generation students face, as she was the first in her family to graduate college or receive an advanced degree. Although no one else in her immediate family has a college degree, they always emphasized the importance of getting a college degree as a means to a better life. In her free time, Kaylie enjoys spending time with her family, friends, dog, and tortoise. She particularly enjoys music, coffee, outdoor activities (when it’s not 100+ degrees), and seeking out novel experiences.

Panelist: Iris Borunda is a fourth-year Mechanical Engineering student pursuing a certificate in Pre-Health Care Administration. She plans to graduate with her bachelor’s degree in Spring 2025. Iris has had many amazing experiences abroad. She recently had the honor of participating in the Partnerships for International Research and Education (PIRE) program funded by the University of Oklahoma and the University of Vermont. Through PIRE she travelled to Japan, where she studied the mechanical properties of polymers for eight weeks. She has also had the pleasure of experiencing a College of Engineering, Architecture, and Technology (CEAT) Diversity, Equity, and Inclusion (DEI) Study Abroad trip to Morocco and Spain this past spring break. Iris is currently the President of Oklahoma State University’s student chapter of the Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS) and presented research at last year’s national SACNAS meeting in Puerto Rico.

Panelist: Maria Castaneda, Ph.D., is a clinical research scientist at Eli Lilly, with a background in small molecule synthesis, drug screening, and clinical trial research. Maria started her journey as a former LSAMP Scholar at the University of Tulsa. She went on to complete her doctorate in Chemistry and Biochemistry at the University of Texas at Dallas being awarded the NSF graduate research fellowship (NSF GRF) for her work. Upon being awarded her Ph.D., Dr. Castaneda went to work at MD Anderson, being awarded an NIH T32 fellowship for her work in deciphering pathways governing cancer metastasis. Dr. Castaneda continues to have a passion for the advancement of minorities in STEM fields both in academia and industry.
Panelist: Kalen Strunk  I’m Kalen Strunk from Oklahoma City, a third-year microbiology student at Oklahoma State University. I made the choice to join OSU due to the exceptional research opportunities that it offers to its students, along with the welcoming atmosphere. I have presented my research at multiple local and national conferences. During the summer of 2023, I participated in a Research Experience for Undergraduates (REU) program at the University of Southern California, where I investigated correlating the physiology of giant sea kelp to its microbiome. As a McNair and OK-LSAMP Scholar, I am eager to continue exploring new opportunities and look forward to the unique research prospects that OSU provides, all while being part of a friendly and supportive community.

Panelist: Ashtyn McAdoo  My name is Ashtyn McAdoo. I grew up in Piedmont, Oklahoma, and found a home for four years at Southwestern Oklahoma State University. I graduated from SWOSU in May of 2022 with a Bachelor of Science in Chemistry. With the help of OK-LSAMP, I was fortunate enough to do research under Dr. Timothy Hubin throughout my college career in Inorganic Chemistry and do a summer research internship under Dr. Steve Archibald at the University of Hull in Hull, England in 2022. These experiences were pivotal for my career and personal development, leading me to pursue a Ph.D. at Vanderbilt University. I am in my second year of the Chemical and Physical Biology – Imaging Science Track in the lab of Dr. Eben Rosenthal, where we are researching noninvasive cancer imaging.
Aquino, Adreana - Oral
Streptococcus sanguinis SSA_0809 is a Homotrimeric Reactive Intermediate Deaminase (RID) A with Unique Substrate Specificity

Authors: Adreana Aquino, Alexa Benedict, Brandi Buckner, Chhandosee Ganguly, Leonard Thomas, Rakhi Rajan, Diana Downs and Vijayakumar Somaling

University of Scholar: Southwestern Oklahoma State University
Location(s) of Research: Southwestern Oklahoma State University, Weatherford, Oklahoma, USA, University of Georgia, Athens, Georgia, USA and University of Oklahoma, Norman, Oklahoma, USA
Funding: OK-INBRE SmART, Guy Hagin Endowment funds, CAS organized research funds, OK-LSAMP, NIH-CoBRE OCSB Phase III (# P30GM145423)
Mentor(s): Dr. Vijay Somalinga, Southwestern Oklahoma State University, Weatherford, OK

Reactive intermediate deaminase A (RidA) is a low molecular weight protein in the YjgF/YER057c/UK114 superfamily that accelerates the hydrolysis of enamines/imines to their keto acids. The archetypal RidA subfamily is shown to catalyze the neutralization of toxic enamine/imine intermediates produced during amino acid catabolism. In Salmonella enterica, mutants lacking ridA exhibit physiological defects from the antagonistic interaction of 2AA with pyridoxal phosphate (PLP)-dependent enzymes prompting us to investigate RidA's role in Streptococcus sanguinis, an opportunistic pathogen and the leading cause of subacute infective endocarditis. We recently identified a ~15 kDa protein, SSA_0809 with 50% identity to well-characterized RidA from S. enterica. Furthermore, biochemical analysis of SSA_0809, henceforth SsRidA, revealed that this protein is capable of enamine/imine hydrolysis to non-toxic keto products. In addition, our analysis also showed that SsRidA amino acid substrate preference is unique compared to other well-studied RidA. To better understand SsRidA's catalytic mechanism, apoenzyme structure of SsRidA was solved at 2.0 Å resolution using X-ray crystallography. The SsRidA monomer is composed of a mix of parallel and anti-parallel β-sheets with two α-helices packed against the β-sheets. The overall structure of SsRidA crystallized as dimer of trimers which is unusual.
/BIDDY, JAKE- POSTER 40
OK-LSAMP SCHOLARS TRAVEL TO THE 2017 NATIONAL CONFERENCE ON UNDERGRADUATE RESEARCH (NCUR)

Author(s): Jake Biddy

University of Scholar: Southwestern Oklahoma State University
Location of Research: Southwestern Oklahoma State University, Weatherford, OK, United States
Mentor(s): Trey Biddy, Engineering Intern, (EI)

Per API standards (API 653 specifically), storage tanks wishing to return to full service after a major repair must undergo a hydrotest to ensure they are Fit for Service (FFS). Tanks may forgo the hydrotesting process by utilizing what is known as a hydro exemption, per API 653. This study was concentrated on using Autodesk Inventor CAD to simulate complex physical phenomena known as Finite Element Analysis (FEA). FEA procedures are used to conduct hydro exemption tests for tanks wishing to be returned to service after major repairs are completed. FEA considers tank material, thickness, all constraints such as welds and other joinery methods, the hydrostatic pressure of the commodity stored, etc. The tests were performed on multiple tanks of varying sizes and commodities. Once the FEA tests were conducted, the study was shifted to high level fracture mechanics calculations to verify the results of the FEA study. This is used by companies to provide an inspection service that complies with API standards and provide a cost efficient, environment efficient, and effective method of testing for FFS of storage tanks.

/BORUNDA, IRIS - POSTER 46
MECHANICAL PROPERTIES OF PA6/EVOH/ETFE POLYMER BLENDS FOR HYDROGEN STORAGE

Authors: Iris Borunda, Riku Fukazawa, Naoki Abe, Masataka Sugimoto, Sathish K. Sukumaran

University of Scholar: Oklahoma State University
Location of Research: Yamagata University, Yonezawa, Japan
Funding: National Science Foundation (NSF), OK-LSAMP, McNair
Mentors: Sathish K. Sukumaran, Yamagata University, Madalina Furis, The University of Oklahoma, Matthew White, The University of Vermont, Tsukasa Yoshida Yamagata University

As the world pivots towards net-zero emissions, there is a pressing need for alternatives to fossil fuels. Hydrogen (H2) offers several advantages as one such alternative. H2 storage, however, presents challenges because H2 gas readily diffuses through most materials. To develop materials with improved H2 gas barrier for use in storage tanks, we are exploring blends of ethylene vinyl alcohol (EVOH), which exhibits excellent H2 gas barrier, with Polyamide 6 (PA6). As the hydrogen in fuel cell vehicles must be stored at high pressures and low temperatures, excellent mechanical strength is required also at low temperatures. To this end, ethylene tetrafluoroethylene (ETFE), modified to improve its compatibility with PA6 and EVOH, was added to a PA6/EVOH blend and its tensile and impact properties were investigated. Blend morphology was investigated using electron microscopy and small angle X-ray scattering and its relationship to the mechanical properties examined.

/BROWN, AZARIA - POSTER 34 & ORAL
STATUS OF THE IVORY-BILLED WOODPECKER

Authors: Azaria Brown, Dept. of Animal Science, Malcolm L. McCallum Department of Agricultural and Natural Resources

Langston University, Langston, OK, USA
Location of Research: Langston University Sherman Lewis School of Agriculture and Applied Sciences, Langston, OK, USA
Funding: USDA Evans-Allen Program and OK-LSAMP
Mentor(s): Dr. McCallum Agriculture & Natural Resources Dept; Dr. Chanelle Hayes Agriculture & Applied Sciences Dept, Langston, University

As of 2023, the Ivory-billed Woodpecker may be extinct. However, there is much debate due to repeated claimed sightings. Herein, we review the history of reported observations of this bird, discuss confusing messages about its natural history, and provide some background on the characteristics of observations to date. We plan to use this information to develop a mathematical model estimating the “possibility” that the Ivory-billed Woodpecker is still extant. We conclude that the status of the Ivory-billed Woodpecker is very much in question, whether it ultimately is extinct or not.
/CORTES, ALIXZANDER - POSTER 37 & ORAL
COMPARING THE BIOMASS, HEIGHT, AND PROTEIN OF TWO WINTER WHEAT VARIETIES (OKCORRAL AND BIG COUNTRY) IN SW OKLAHOMA
Authors: Dr. Alimamy Fornah, Alixzander Cortes and Jermaine Berry

University of Scholar: Cameron University, Lawton, OK, USA
Location of Research: Cameron University, Lawton, OK, USA
Funding: Cameron University Endowed Lectureship
Mentors: Dr. Alimamy Fornah and Dr. Husak, Cameron University

This study presents a comprehensive comparison of the biomass, height and protein content of two distinct winter wheat (Triticum aestivum) varieties cultivated in the diverse climatic conditions of Oklahoma. The selection of appropriate wheat varieties is vital for maximizing grain yield and protein quality, particularly in regions with varying environmental challenges. In this research, two winter wheat cultivars, OK-Corral and Big Country, were assessed for their growth characteristics and protein content. To investigate the differences between the two varieties, a field experiment was conducted over two consecutive winter growing seasons. The experiment was setup in a complete randomized block design with varying nitrogen applications. Both morphological and biochemical analyses were performed to assess the biomass height and protein content of each variety. The results were analyzed using SAS software. The findings from this study contribute to the understanding of how distinct winter wheat varieties respond to the climatic conditions of Oklahoma and their subsequent impact on growth and protein content. This information is crucial for agricultural stakeholders, as it assists in making informed decisions regarding the selection of wheat varieties for optimal yield and nutritional quality. The observed differences in biomass height and protein content emphasize the importance of tailoring variety selection to the specific environmental conditions of the region. Future research endeavors could delve deeper into the underlying genetic and physiological mechanisms that drive these observed variations, offering valuable insights into enhancing wheat production and quality in Oklahoma’s diverse agroecosystems.
/COSTELLO, IAN - ORAL
RAPID SCREENING OF A LIBRARY OF N-BENZYL SULFONAMIDES FOR ACTIVITY AS METABOLIC INHIBITORS AGAINST PANCREATIC CANCER
Authors: Megan D. Hopkins, Ian J. Costello, Zachary C. Brandeburg, Emily L. Slay, Levi A. Zanders, Caroline E. Dunn, Carina A. Derewonko, Colin L. Davitt, Madison A. Reeder, Kate Pritchard, Beatrice Chiew, Adam McCluskey, Robert J. Sheaff, and Angus A. Lamar

University of Scholar: University of Tulsa, Tulsa, OK, USA
Location of Research: Oklahoma State University, Stillwater, OK, USA
Funding: OK-LSAMP, Oklahoma Center for the Advancement of Science and Technology
Mentor(s): Dr. Angus Lamar, University of Tulsa

The Lamar Research group synthesized various benzylsulfonamide compounds with the goal to promote selective cell death in pancreatic cancer cells. Traditional screening methods that expose the cells to the drug compounds for 24-72 hours provided examples of cytotoxic compounds, albeit with little to no selectivity. Focus then shifted to these sulfonamide compounds affecting cell viability through inhibiting the metabolic process of mitochondria. Thus, a rapid (1-2 hour) assay was performed to screen the library of compounds, in an attempt to determine which compounds influence cell viability. There were 8 compounds that inhibited ATP production significantly. Those compounds were then screened with the rapid assay at varying concentrations to determine the IC50 value for each. The IC50 is an important value in pharmacological studies because it depicts the concentration at which the drug is at 50% efficacy. Further research is being conducted to determine the IC50 values for non-cancer cells to see whether those values are significantly higher than those of the pancreatic cancer cells. If so, then these compounds would have viable applications for therapeutic pancreatic cancer drugs.

/CRAVENS, SHERMAN - POSTER 45 & ORAL
IT'S MORE THAN JUST ASTRONAUT ICE CREAM! HOW FREEZE-DRYING WORKS, BEST PRACTICES, AND THE POTENTIAL IMPACT IT CAN HAVE ON THE 21ST CENTURY DIET AND HOME (CROP TO FOOD REU)
Authors: Sherman Cravens and Juan Pablo Camargo Pena

University of Scholar: Langston University, Langston, OK, USA, University of LaSabana, Columbia.
Location of Research: University of Nebraska, Lincoln, NE, USA
Funding: United States Department of Agriculture National Institute of Food and Agriculture (USDA NIFA)
Mentor(s): Dr. Mary Grace C. Danao, University of Nebraska

The process of freeze drying has been known for over 300 years first being demonstrated as a preservation method for potatoes by the Incas of Peru, in modern times freeze drying is most associated with astronaut ice cream and NASA since the technology was further progressed as a method to provide shelf stable plus nutritional food in microgravity. Today, freeze drying is used often as a preservation method within the Pet Food industry. Recently, the cost of freeze dryers has dropped considerably, meaning more homeowners are purchasing these units to make foods at home or for retail. The problem lies in that there is a general lack of concrete information regarding freeze drying and the process of it. My objective this summer during my research was to conduct freeze-drying experiments seeking consistency between different cycles with the same variables to help set a standard. These standards could then be used for needed extension documents that could guide and aid the public on how to use freeze-drying technology properly. My research included doing experiments with varying sized pieces of turkey breasts cubes and in some cases goat meat then analyzing the active moisture within a random selection of equipment, and procedure to follow so more individuals will be able to utilize freeze drying at home and preserve healthy foods.

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ORAL & POSTER ABSTRACTS
**/DURAN CHAVES, JACQUELINE - POSTER 35**

ADVANCING IMIDAZOLE RESEARCH TO EXPLORE ITS POTENTIAL TO COMBAT MICROBIAL PATHOGENS

Authors: Jacqueline Duran Chaves and Elizabeth Nalley

University of Scholar: Cameron University, Lawton Oklahoma
Location of Research: Cameron University, Lawton Oklahoma
Funding: OK-INBRE
Mentor: Dr. Elizabeth Nalley, Cameron University

The increasing threat of antimicrobial resistance demands a renewed focus on the development of effective strategies to combat pathogenic microorganisms. Imidazole derivatives have emerged as a promising avenue for antimicrobial research. The significance of our imidazole research is to pursue the possibility of new novel antimicrobial agents capable of targeting and eliminating specifically, Bacillus subtillis, Escherichia coli, and Candida albicans.

We have taken advantage of imidazole's unique chemical structure which allows for versatile modifications and its five-membered aromatic heterocyclic build which make it ideal for designing and synthesizing antimicrobial compounds. Imidazole type compounds were synthesized using the following chemicals: 2-3 Butanediione, p-Ethoxybenzaldehyde, p-Chlorobenzenaldehyde, 2-phenyl-2-imidazoline, p-Toluadehyde and 2,4,5 trimethylimidazole.

We performed IR spectrums and NMR tests to verify our products. We then conducted bioassays to test their ability to disrupt the essential cellular processes of the aforementioned microorganisms. Our imidazole research is significant in efforts to discover new effective antimicrobial agents, researchers can develop tailored solutions to combat bacterial infections, overcome resistance mechanisms, and improve patient outcomes. Continued advancements in imidazole research hold great promise for addressing the urgent need for novel strategies to combat microbial pathogens, ensuring a brighter future for infectious disease management.
BEYOND SUGAR: WHAT PANCREATIC CANCER CELLS NEED TO GROW?
Authors: Colter Esparza, Malachi Newton, Darren Powers
University: Southwestern Oklahoma State University (SWOSU), Weatherford, OK
Location of Research: Department of Biological and Biomedical Sciences, SWOSU, Weatherford, OK
Funding: OK-LSAMP, and OK-INBRE
Mentor: Dr. Pragya Sharma

Pancreatic ductal adenocarcinoma (PDAC) is a type of exocrine pancreatic cancer that develops in the pancreatic duct cells. PDAC is an aggressive malignancy with a median survival time of 10-12 months. It is predicted to become the second leading cause of cancer-related deaths by 2030. Therefore, it’s imperative to understand the biology of PDAC and identify putative therapeutic targets. To sustain their proliferation, many cancer cells, including PDAC, exhibit rapid glucose consumption, with most of the glucose-derived carbon being secreted as lactate despite abundant oxygen availability (the Warburg effect). While the Warburg effect is an important feature of cancer, studies have shown that cancer can adapt to the rapidly changing tumor microenvironment by gaining diverse metabolic phenotypes, the “metabolic plasticity.” The present study aims to understand the mechanisms of metabolic plasticity in pancreatic cancer cells while identifying the specific nutrients that sustain pancreatic cancer cell growth under metabolic stress. We used Mia-Paca2 pancreatic cancer cell lines to study pancreatic cancer metabolism. The glycolytic metabolic resilience of pancreatic cancer cells was challenged by substituting glucose with galactose as a carbon source, a condition that inhibits glycolysis. Our data indicate a decrease in cell viability and a mild suppression of cell growth under glycolytic inhibition. More than 60% of cells survived, suggesting that cells might adjust to energy-related challenges through metabolic reprogramming. Using RT-PCR and immunoblotting, we are studying metabolic gene expression associated with Glycolysis, OXPHOS, and glutaminolysis. Identifying differentially regulated metabolic genes during the metabolic crisis can help us identify new targets against pancreatic cancer.

MECHANICAL PROPERTIES OF POST-CONSUMER PET RESINS
Authors: Kaden Eyler, Anuj Maheshwari
University of Scholar: Oklahoma State University
Location of Research: Oklahoma State University, Stillwater, OK 74077
Funding: Oklahoma State University
Mentor: Dr. Frank Blum, Oklahoma State University

Polyethylene terephthalate (PET) is a common polyester plastic used in consumer goods. Unfortunately, many PET products end up in landfills, decomposing slowly over many years. Nonetheless, a promising solution exists. By recycling PET, it is possible to create valuable materials sourced from items like water bottles, carpets, and more. This project centers on exploring diverse sources of post-consumer PET, focusing on its practical applications for the public. The manufacturing process for these materials uses a straightforward route: compression molding of different materials in a mold, a technique often used to make composite materials. The assessment of the resultant samples involves tests for properties like flexural strength, modulus, and creep. These composite materials exhibit favorable mechanical properties, suggesting their potential suitability for structural roles. Future investigations will delve into their response to factors such as UV radiation, temperature variation, water resistance, and interactions with organic compounds from domestic environments. The post-consumer PET resins utilized in this work encompass a range of origins: carpet tufts, rejected industrial PET bottle flakes, recycled pellets, and reclaimed polyester sheets.
SYNTHESIS OF CBN FROM Δ8-THC

Authors: Diego Fernandez and Syed R. Hussaini

University of Scholar: The University of Tulsa, Tulsa, OK, USA
Location of Research: The University of Tulsa, Tulsa, OK, USA
Funding: Oklahoma Louis Stokes Alliance for Minority Participation (OK-LSAMP), Tulsa Undergraduate Research Program, Interdisciplinary Project Grant from The University of Tulsa, and Chemists Student Undergraduate Research Program
Mentor(s): Syed R. Hussaini, University of Tulsa

(Note: This work will not involve any illegal chemicals such as Δ9-THC, commonly known as THC).

The Cannabis plant produces a variety of molecules that interact with the human endocannabinoid system. These molecules, named cannabinoids, are drugs with many benefits ranging from pain relief to appetite stimulation. The most popular cannabinoids currently used for medicinal purposes are Δ9-tetrahydrocannabinol (Δ9-THC) and cannabidiol (CBD). These two substances are the primary cannabinoids found within the cannabis plant, but there are many more cannabinoids that can provide possible therapeutic benefits that occur in minor quantities. One of these minor cannabinoids, cannabiol (CBN), has promising potential as a sleep aid. There are several pathways to synthesize CBN using other cannabinoids such as CBD and Δ9-THC as the starting material. However, one method that has not been heavily explored is the conversion of Δ8-THC to CBN. Past attempts in the literature have resulted in a failed synthesis. By building on the work from this and other literature we have successfully found a way to convert Δ8-THC into CBN and are continuing to search for other possible methods and conditions in which this reaction can take place. Finding a way to convert Δ8-THC into CBN will not only provide the Hemp industry with multiple ways to create CBN but also introduce new methodology into the literature.

ENGINEERING AND USING INEXPENSIVE TRANSDUCERS TO MEASURE DENSITY OF MATERIAL THROUGH SPEED OF TRANSMISSION

Authors: Derik Ferry, Dr. Karen Williams, Dr. Douglas Bryhan

University of Scholar: East Central University
Location of Research: East Central University, Ada, Oklahoma, United States
Funding: OK-LSAMP and NSF
Mentor(s): Dr. Karen Williams, East Central University, OK-LSAMP. Dr. Douglas Bryhan, East Central University.

Transducers used for industrial cleaning are plentiful and inexpensive, whereas transducers which are specialized for research are expensive. In this research project it is shown that with inexpensive transducers, function generators, an oscilloscope, a DC power supply, and a simple circuit, better than 3% error could be achieved across polyacrylic, aluminum, brick, and concrete with the measurable length being greater than a meter.
/FISHER, MECCA - POSTER 44 & ORAL
ALTERED SURFACTANT AND HAMA PUSHED THROUGH A MICROFLUIDIC CHIP TO FORM MICRODROPLETS
Author: Mecca Fisher
University of Scholar: University of Oklahoma
University of Oklahoma, Norman, Oklahoma, United States
NIEC: Neuro-Immuno-Engineering Collective
OK-LSAMP
Dr. Clegg-University of Oklahoma

The Neuro-Immuno-Engineering Collective (NIEC), we research into hydrogels and innate immune cell-based therapeutics for the treatment of neurological diseases and intracerebral hemorrhage affecting 200,000 Americans a year. Granular Hydrogels are being considered a novel discovery in recent years for its self-healing properties, extrudability, porosity, and modularity. In my research lab, we currently use bulk hydrogel which when loaded with macrophages and used shows a limited yield. In reference to literature, we hypothesized that if we loaded the macrophages into granular hydrogels, it would present increased porosity, which will allow nutrients and secretome created by the macrophages to transport more effectively than a bulk hydrogel. To create granular hydrogels, it would involve the curing and washing of microdroplets. We established a protocol using microfluidic chips, surfactant and Methacrylated Hyaluronic acid with the problem being in finding an optimal flow rate for the solutions to form such microdroplets through the microfluidic chip. By finding the optimal flow rate based on the consistent size of the microdroplets, synthesis speed of the microdroplets, and low maintenance of the system for the surfactant and HAMA to flow to form hypothesized microdroplets and analyzing the presence of microdroplets using the image analysis program called image J, we have found a method in order to form microdroplets to contribute to the formulation of granular hydrogels.

/FRIES, MATT - POSTER 20
WATER REUSE IN OKLAHOMA
Authors: Matt Fries and Dr. Jeff Sadler
University of Scholar: Oklahoma State University, Stillwater, OK, USA
Location of Research: Oklahoma State University, Stillwater, OK, USA
Funding: OK-LSAMP, NSF, OSU Biosystems and Agricultural Engineering Department
Mentor(s): Dr. Jeff Sadler, Oklahoma State University

Increasing droughts and water demand are putting growing stress on our water resources. Water reuse or reclamation has recently been looked at as an approach for more fully utilizing water resources. Despite the rise in attention given toward water reuse, there are still major challenges, including cost (economic and environmental) and negative public perception. Additionally, in Oklahoma, there are but few publicly accessible informational resources regarding water reuse. This investigation includes researching and documenting existing solutions in Oklahoma, documenting other potentially useful approaches from outside of Oklahoma, and determining the costs, barriers, and benefits of these approaches to publish as an educational resource on water reuse in Oklahoma. The background research performed revealed that most of the water reuse projects around Oklahoma are utilizing this technique for industrial application or irrigation. Although these are the most prominent uses, there are currently plans for Indirect Potable Reuse (IPR). The application of reclaimed water ranges in type relative to the water quality category that the treated water meets. Although much progress has been made toward this range, there are many challenges still in front of water reuse for IPR as well as effective use in irrigation and industrial applications. In addition to these barriers, there is a common misunderstanding of water reuse in public perception. Despite these obstacles, water reuse is increasing in Oklahoma and time will result with even greater development and more full utilization of water resources.
GARCIA, REECE - POSTER 23
MCNAIR SCHOLAR - REECE GARCIA
McNair Mentor - Jake A. Pruett

Reptiles rely on chemicals to communicate information about sex, individual identity, territoriality, and competitive ability. Chemicals of various classes (e.g. alcohols, aldehydes, and fatty acids) are produced from specialized glands or are present in bodily fluids and released into the environment to transmit information to specific receivers. The relative proportions of specific compounds and/or classes of compounds can differ among individuals, populations, and species, and such characterizing such variation is a first step to understanding potential information content. American alligators (Alligator mississippiensis) possess glands on the anterior aspect of the jaws that exude pungent chemicals during the active season; however, the function of these chemicals is unknown. Alligators are of conservation concern in Oklahoma, and the only known breeding population in the state occurs at Red Slough Wildlife Management Area (RSWMA). Ongoing research is focused on movements, habitat use, and population demography at RSWMA, but no studies have thoroughly examined social communication in this population. Here, we propose a study to characterize the chemical secretions from gular glands of alligators at RSWMA. We will collect samples from animals in the field and analyze the chemical composition using analytical chemistry techniques.

GARDNER, ADONIS - POSTER 6
EFFECTIVE WAYS OF TEACHING TODAY’S LEARNERS
Author: Adonis Gardner

Engineering pedagogy is the study of teaching and learning in engineering. It involves understanding how to effectively convey engineering concepts and skills to students, and how to create a learning environment that supports student success. This research aims to explore current trends and best practices in engineering pedagogy, with a focus on identifying strategies that can improve student learning and engagement. The study will include a literature review of existing research on engineering pedagogy, as well as a survey of engineering students to gather data on their learning preferences and understanding of engineering concepts. The results of this research will be used to inform the development of new pedagogical approaches and resources for engineering education in Endeavor Labs at Oklahoma State University.
/GATES, CHARLES - POSTER 28

ANNEXIN A2 EXPRESSION IN PROSTATE CANCER CELLS

Authors: Charles R. Gates, Amit Kumar Tripathi, Jamboor K. Vishwanatha, Pankaj Chaudhary

University of Scholar: Langston University
Location of Research: University of North Texas Health Science Center, Fort Worth, TX.
Funding: National Institutes of Health
Mentor: Pankaj Chaudhary, UNTHSC

Metastasis is a major cause of morbidity in prostate cancer patients, the primary mortality is metastasis to the bone tissue. Despite substantial efforts to understand prostate cancer metastasis, the mechanisms involved in preparing the metastatic niche for colonizing the prostate cancer cells are still not known. Therefore, there is an urgent need to identify essential regulators of bone metastasis in prostate cancer for therapeutic targets. Annexin A2, a calcium-dependent phospholipid binding protein that is overexpressed in the poorly differentiated high-grade adenocarcinomas of prostate cancer. Phosphorylation of AnxA2 at tyrosine-23 creates an important event for the localization of AnxA2 to the cell surface. At the cell surface, it provides a binding site for tissue plasminogen activators, and converts plasminogen into plasmin. Which plays an important role in invasion and metastasis of cancer. However, the cell surface expression of AnxA2 in prostate cancer is unknown. Therefore, in the present study, we demonstrated the cell surface expression of AnxA2 in prostate cancer cells to delineate the mechanism of bone metastasis. Prostate cancer cell lines, PC3 and DU145 were grown. Immunoblotting was used to detect the expression of pAnxA2-Y23 and AnxA2 proteins in cells. Our results demonstrated that the expression of pAnxA2-Y23 is very high in prostate cancer cells (PC3 and DU145 cells) compared to normal prostate epithelial cells. However, the expression of total AnxA2 in both prostate normal and cancer cell lines is comparable. Results suggest that the cell surface expression of AnxA2 is high in prostate cancer cells due to increased phosphorylation of AnxA2 at tyrosine 23.

/GRAYSON, TEARSNEY - POSTER 25

ABSTRACT

Bacteria chondronecrosis with osteomyelitis (BCO) is the leading cause of lameness in broilers. This disease is important because it poses serious animal health and welfare issues. Staphylococcus aureus and agnetis are important to the onset of BCO lameness. In human there is a version of osteomyelitis that is common in children, smokers, and individuals with pre-existing conditions. While there is still no reliable model for studying human osteomyelitis, the condition is effectively controlled with antibiotics. In broilers production on the other hand, the use of most antibiotics is no longer an option for the legitimate concern of developing superbugs that maybe resistant to all known antibiotics used in treating humans. We have been exploring avian defensin peptides (AvBD) as potential therapeutic alternatives to antibiotics. Defensins have been shown to be effective antimicrobials agents that microbes hardly form resistance against. In this, work we followed-up on the levels of expression of AvBD in ileum and liver of broilers vaccinated with Formalin-killed or Electron Beam-killed S. aureus and S. agnetis vaccines on Day 58. Lyu et al. (2020) had earlier reported that AVBD 1-6; 8-14 are expressed abundantly and in great folds in several broiler tissues between Days 0 – 28. Our project is the still in the early stages, but we have recorded significant expression and some upregulation of AvBD1, 2, 8, and 14 in the liver and ileum of 58-Day broilers vaccinated against Staphylococcus spp. We want to see if there is a relationship between the expression of β-defensin and broiler survival against BCO.
Aposematic signaling in animals has been a sector of interest to biologists for many years. Aposematic signals are used by animals to dissuade predators from attacking and is often communicated in the form of bright colors or patterns. The Western Diamondback Rattlesnake (Crotalus atrox) is an animal that has two modes of aposematic signaling. The first mode is the well documented auditory aposematic signal the rattling of the tail. The second mode is still poorly studied and consists of the use of the diamond patterns on its back in order to avoid predation. In this study we sought to investigate how the diamond pattern on the snake affects its predation. The Western Diamondback Rattlesnake was chosen for its definitive marking and regional accuracy. To investigate snake predation, replicas of snakes will be made from clay. The clay replicas will vary in the size of the diamonds relative to the replica size in order to test the impact of diamond size and predation. The models will be placed in natural areas nears Weatherford, Oklahoma for a single month. During the experiment the models will be placed onto white backgrounds to remove the natural cryptic effect of the patterns. Replicas will be analyzed by the imprint left by predation attempts. For this experiment we hypothesize that the diamond indeed works as an aposematic signal and that larger diamonds will act as a stronger warning signal. We expect higher predation rates on replicas without diamond patterns and higher predation attempts on snake replicas with smaller diamonds when compared to replicas to replicas with larger diamonds.

Multiple sclerosis (MS) is a chronic inflammatory disease that affects the central nervous system, commonly referred to as the brain and spinal cord. Inflammation causes demyelination of the nerves leading to neuronal damage and disability in patients. Inflammation, demyelination, glial activation, and oxidative damage are authenticated markers for MS. Smoking cigarettes is a lifestyle factor with severe health consequences. Smoking increases the susceptibility to developing MS and worsens the disease prognosis with severe health consequences for the general population. Cigarette smoke has over 4,000 chemicals that cause abnormal cell responses and tissue damage in the lungs, which drives pathology in MS. Our lab has shown that MS patients who smoke have elevated levels of S100 proteins in the blood. S100s are damage-associated molecular pattern proteins (DAMP), which drive severe inflammation in the central nervous system of MS patients. Black pepper (Piper nigrum) contains 5%-9% of the bioactive alkaloid, piperine, which may have neuroprotective, anti-inflammatory, and antioxidant properties. The goal of this project was to determine if piperine reverses the inflammatory effects of cigarette smoke. To test this hypothesis, we assessed piperine's in vitro effects on human peripheral blood mononuclear cells (PBMCs) cultured in cigarette smoke extract (CSE). Specifically, we cultured PBMCs with either 0%, 20%, or 40% CSE in the presence or absence of increasing concentrations of piperine. In the absence of piperine, CSE induced PBMCs to secrete the inflammatory DAMP, S100A9. Strikingly, we found a dose-dependent reduction of S100A9 by piperine in PBMCs cultured with either 20% or 40% CSE.
THE INFLUENCE OF HIGH-TIDES ON THE PHYSIOCHEMICAL PROPERTIES OF TIDAL CREEKS OF THE WOWRI ESTUARY

Authors: HUCK, Lori¹, AGIY, Pauline Bih², ATEDJOE, Fabienne³, CASTELLANO, Sandy⁴, GILLEN, Spencer⁴, ELAT MEKONG, Hugues², LETSHELE, Kesego⁴, SUNJO, Claris Nyuysioni², WUKONG, Stephanie Akwi², AGBOGUN, Henry³, ALI, Hendratta⁵, ATEKWANA, Eliot⁴, NJILAH, Isaac², (1)

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The Wouri estuary is surrounded by numerous tidal creeks transecting a wide range of communities and geology. Diverse ecosystems, varied human activities, and diurnal tidal changes are expected to significantly influence the chemical properties of these tidal creeks. We evaluated two selected tidal creeks to understand physiochemical changes resulting from rising tides. For this study, we conducted spatial measurements of water samples from the Dr. Creek to the East and the Mowasse Creek to the West of the Wouri Estuary in Cameroon. To capture the physiochemical variations, a multi parameter probe was used to measure pH, salinity, dissolved oxygen, temperature, total dissolved solutes. Alkalinity in mg/L of CaCO3 of the samples were also measured using a portable digital titrator. We sampled 13 locations at an interval of 1km along the Dr. Creek and 8 locations at 2km interval along the Mowasse Creek during high tide. Results showed that the measured properties were relatively uniform from the estuary to 7 km and 11 km into the Dr. Creek and the Mowasse Creek, respectively. Beyond these distances from the estuary, the measured properties showed non uniform behaviors. We interpret the distances to be the limits of significant tidal effect on water properties.

THE MOVEMENT OF THE STALK IN DROSOPHILA

Authors: Daysha Isaac and Jocelyn McDonald

University of scholar: Langston University
Location of Research: Kansas State University
Funding: Kansas Idea Network of Biomedical Research Excellence
Mentor(s): KJ Abraham

In my research on Drosophila melanogaster, I was able to study the cell movement in the ovaries of the fruit fly. I mainly focused on the movement of the stalk, that is located in between the egg chamber of the ovariole. Which multiple ovarioles can make up one ovary. By looking at the movement of the stalk we can connect it to various birth defects. These birth defects can include but are not limited to Spina Bifida and Microcephaly. This is because the movement of the cells in the stalk can be closely related to the development of new cells. The purpose of my research was to be able to look at the movement of the stalk. Then try to limit the movement of the stalk. We hypothesized that the stalk starts moving at stage 4 and will stop its moving in the later stages. By adding a mutation to the msn signaling gene, which signals the stalk to move, we can prevent the stalk from moving. I Successfully conducted my research through the dissection of the ovaries. After the removal of the ovaries, I then was able to strategically remove the muscle sheath around the ovarioles, while maintaining the attachment of the stalk. I was then able to use various primaries and secondaries to help fluoresce the stalk under the fluorescent microscope. I lastly used genetic crossings to add the mutations to my female drosophila. After conducting my research, I concluded that stalk movement was present in stage 4, and it stops in later stages.
**JAMES, JIHRA - ORAL**

**DEVELOPMENT OF A NOVEL MICROGEL CONTAINING CXCL12 AND FAS-LIGAND TO ENABLE ALLO-ISLET TRANSPLANTATION WITHOUT SYSTEMIC IMMUNE SUPPRESSION FOR T1D**

Authors: Jihra James¹²³, Fatma Dogan⁴, Ph.D. and Mark Poznansky⁵, MD, Ph.D.

¹Langston University
²Student Trainee Research Program Center for Diversity and Inclusion
³Vaccine and Immunotherapy Center, Massachusetts General Hospital

Type 1 diabetes (T1D) is an incurable disease caused by autoimmune destruction of pancreatic islet cells. Islet transplantation proven to be successful in curing T1D, but the requirement for chronic systemic immunosuppression and the scarcity of donor islets are barriers to its implementation. The objective of our research is to combine the immune-modulatory proteins, CXCL12 and Fas-ligand (Fas-L), with allogenic donor murine alloislets to enable immunoprotection and support of beta-cell function without the need for systemic immune suppression. As a first step towards this objective, we have constructed a streptavidin fusion protein with the immunomodulatory proteins FasL and CXCL12 that self-assemble with and then release from biotinylated microgels. We are currently studying how these immune modulatory proteins are released from the microgel in vitro. To this end we are developing a novel HABA (4'-hydroxyazobenzene-2-carboxylic-acid) based assay to quantitate this. The ratio of unbound HABA to HABA bound to free biotin or SA-CXCL12 protein can be read by measuring light absorbance at 500nm. In this way we have begun to determine the kinetics of release of SA-CXCL12 and SA-FasL from biotinylated microgels. Assay design and preliminary data generated using the assay will be presented.

**JONES, SHANDRA - POSTER 13**

**IDENTIFICATION OF TRADITIONAL CHINESE MEDICINE MULTIPLE FORMULAS EFFECTIVE ON INCREASING INSULIN SENSITIVITY USING A DRUG SCREENING PLATFORM**

Authors: Shandra Jones¹, Juan Montes¹, Jonathan Ritter¹, Ying-Chou Lin², Ning Wu¹, Melody Chan³, Shih-Yin Chen³

¹Department of Biological Science, ²Department of Accounting and Finance, Southeastern Oklahoma State University, Durant, OK, USA. ³Genetic Center, Department of Medical Research, China Medical University, Taichung, Taiwan.

Type II Diabetes Mellitus (T2DM) is a major health issue which affects millions of people worldwide. The peroxisome proliferator-activated receptor γ (PPAR-γ) is a nuclear receptor protein that functions as transcription factor regulating the expression of several target genes governing adipocyte differentiation and glucose and lipid metabolism, as well as insulin sensitivity and inflammatory pathways. The objective of this study was to identify the Traditional Chinese Medicine (TCM) multiple herb formula that effectively promoted the transcription of PPAR-γ gene to explore a potential alternative treatment for T2DM. A drug screening platform that utilized a Luciferase assay-based method was employed to explore the effectiveness of multiple combinations of 299 TCM formulas that enhanced the promotor region of the PPAR-γ gene. pGL4.17 vector contained the promotor region of the PPAR-γ gene was transfected into 293T cells and incubated at 37°C, 5% CO₂, overnight. Following selection with G418 solution and overnight incubation, cells were sub-cultured and seeded into 96-well plates at a density of 15,000 cells per well. After overnight incubation, cells were treated with a control medium, a control with 1% DMSO, and various 2% TCM multiple herb formulas. Luciferase assays were performed to measure the cells’ bioluminescence. The cells’ light emissions were measured at 500 nm by using a Berthold Technologies Mithras LB 940 Luminometer. The results showed that the top 10 multiple combinations of TCM formulas that exhibited high luciferase readings, indicating the high effects on PPAR-γ gene promotor region.
/KUNDAK, MARIELA - POSTER 43
PRAIRIE DOGS IN THE WICHITAS: MYSTERIOUS DECLINE IN COLONIES
Authors: Kaitlyn Tucker, Mariela Kundak, Courtney Duchardt, Lindsey Buehler

University of Scholar: Oklahoma State University, Stillwater, OK, USA
Location of Research: Oklahoma State University, Stillwater, OK, USA
Mentor(s): Dr. Courtney Duchardt, Oklahoma State University

Wildlife declines are becoming more prevalent in the United States due to habitat loss, disease, and species competition. Black-tailed prairie dogs (Cynomys ludovicianus) are declining across the Great Plains due to both habitat loss and persecution because of perceived and real conflict with agriculture. Especially in smaller prairie dog colonies in the central US, this depletion has been recognized, as have cascading effects on associated wildlife species. The Wichita Mountains National Wildlife Refuge in Oklahoma is currently facing a similar decline; one colony at the refuge recently declined, and no prairie dogs have been observed since the summer of 2022. One factor that could cause this decline could be vegetation height, because prairie dogs prefer short vegetation. We are especially interested in analyzing if the vegetation is too tall for the prairie dogs to manage themselves in the eastern part of their range, where it is wetter, and grass grows taller. Using spatial boundary data and species counts over the years, we will attempt to determine if prairie dogs left this colony to merge with another colony, or if other factors drove these declines. We hope to mark animals and possibly use genetic testing to evaluate these patterns in the future.

/MANNING, DAWSON - POSTER 11
DESIGN AND EVALUATION OF PROPELLER FLOW CONTROLS TO SUPPRESS BOUNDARY LAYER SEPARATION FOR LOW REYNOLDS NUMBER OPERATIONS
Authors: Dawson Manning, Dr. Kurt Rouser

University of Scholar: Oklahoma State University, Stillwater, OK, USA
Location of Research: Advanced Technology and Research Center, Oklahoma State University, Stillwater, OK, USA.
Funding: OK-LSAMP, National Science Foundation (NSF), and the department of Mechanical and Aerospace Engineering.
Mentor(s): Dr. Kurt Rouser, Oklahoma State University

This research covers the experimental results for two propellers with varying flow controls to suppress boundary layer separation. The two propellers were first modeled using computer aided design software, starting with a scanned 16-inch by 10-inch APC propeller. Two novel propeller designs were created, each with integrated flow controls consisting of a singular rectangular jet acting as a flow control. One jet is cut at 20 degrees and one at 40 degrees measured from the surface of the propeller. To test the performance of the jet geometry of each propeller, data was captured for advance ratios from 0.35 to 0.6 at 20, 30, and 40 ft/s bulk flow velocities. The coefficient of thrust at varying advance ratios is compared to the baseline unmodified propeller.
**/MARTIN, ANNE - ORAL**

AUTOMATED IMAGE ANALYSIS FOR PERICYTE AND ENDOTHELIAL CELL QUANTIFICATION IN DIABETIC RETINOPATHY

Authors: Anne Martin, Lauren Wilcox, Madison Whitekiller, Luis Vazquez, Dr. Joshua Butcher, and Dr. Cammi Valdez

University of Scholar: Northeastern State University, Tahlequah, OK, USA
Location of Research: Northeastern State University, Tahlequah, OK, USA
Funding: National Institute of General Medical Sciences of the National Institutes of Health*, Genentech Career Development Award for Underrepresented Minority Emerging Vision Scientists, Oklahoma Louis Stokes Alliance for Minority Participation through the National Science Foundation
Mentor: Dr. Cammi Valdez, Northeastern State University

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The biggest cause of blindness in working-aged adults is diabetic retinopathy, a complication of diabetes that degrades the retina and affects one third of diabetic patients. Symptoms of diabetic retinopathy typically only occur in later stages, when it is too advanced to cure or treat properly, creating a dire need for early stage prevention. An early sign of diabetic retinopathy and a possible target for therapy is the loss of pericytes in retinal capillaries, where the ratio of pericytes to their neighboring endothelial cells drops from 1:1 to 1:4. While the loss of these pericytes are detectable using brightfield microscopy, manual image analysis is particularly time consuming and prone to error, given that 20-30% of pericytes and endothelial cells in mouse retinal vasculature are unidentifiable. In order to make image analysis more accurate and less time-consuming, the Valdez Lab has created an automated analysis program using CellProfiler modules to count and outline cells, eliminating human bias in counting endothelial cells and pericytes. The lab is also currently working on an algorithm designed to classify endothelial cells and pericytes to determine the ratios.

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**/MASTERS, AKILAH - POSTER 21**

THE ROLE OF FAM2B IN ENDOTHELIAL TRANSCRIPTIONAL PROGRAMS

Authors: Akilah Masters¹², Marina Augusto Heuschkel³, Aspasia Tzani³, and Jorge Plutzky³

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The endothelium, the inner lining of all blood and lymphatic vessels, is now recognized as a central determinant in maintaining systemic homeostasis, including regulation of flow, delivery of bioactive molecules, and recruitment of cells into specific tissues. Disruption of this physiologic balance is a key contributor to pathologic responses. An important example of this role for endothelial cells (ECs) is inflammation, which is necessary for host defenses but also a major trigger for cardiovascular disease. Prior studies in human umbilical ECs (HUVECs) including RNA-Seq data identified FAM2B as a gene expressed in ECs under basal conditions but without a known role in endothelial biology. Further analysis of single-cell RNA sequencing data uncovered that FAM2B was predominantly expressed in lymphatic ECs within samples from healthy human hearts. Given FAM2B expression in ECs, its unknown role in the lymphatic endothelium. We investigated what role FAM2B might play in ECs and more specifically in the lymphatic system. Small interfering RNAs were used to repress FAM2B expression in human dermal lymphatic ECs in vitro. Molecular assays were performed to evaluate FAM2B cellular localization and expression under basal and TNF-alpha stimulation as a model inflammatory stimulus. Our results support FAM2B as predominantly expressed in lymphatic ECs compared to HUVECs (+1.7 fold higher). FAM2B was also more expressed in ECs versus other vascular cell types including smooth muscle cells (+1.6 fold higher) and fibroblasts (+6.7 fold higher).
/McBRIDE, KAYLEY - ORAL
PARAVIEW-ING DATA AT NERSC REMOTELY USING JUPYTER HUB
Author: Kayley McBride

University of Scholar: University of Central Oklahoma, Edmond, OK, USA
Location of Research: Lawrence Berkeley National Laboratory, Berkeley, CA, USA
Funding: Lawrence Berkeley National Laboratory and OK-LSAMP
Mentors: Dr. Johannes Blaschke, Lawrence Berkeley National Laboratory, Dr. Gang Xu, University of Central Oklahoma

ParaView is an open-source data analysis and visualization program that is used by researchers around the world to analyze complex scientific datasets, containing things like a mixture of particles and fluids. Due to their size and complexity, these datasets cannot be easily analyzed with general-purpose tools like Microsoft Excel. Prior to this project, ParaView data at Lawrence Berkeley National Laboratory was exclusively analyzed using the ParaView graphic user interface (GUI) client. However, Jupyter is an increasingly popular web-based application that allows users to create and share documents containing code. This project is exploring ways to extend ParaView support in Jupyter. Kitware (the creators of ParaView) have developed a kernel for Jupyter that allows a python representation of the ParaView scene in Jupyter to be rendered by ParaView and displayed in the same notebook. In previous work we have shown that Jupyter notebooks running the ParaView Kernel can be set up on a personal computer and connected to a ParaView server that is running on a supercomputer. This project aims to fully implement this kernel on the supercomputers at the National Energy Research Scientific Computing Center (NERSC) through Jupyter Hub.

/McMEJIA, BETHANY - ORAL
NEW TOOL DEVELOPMENT FOR IDENTIFICATION AND QUANTIFICATION OF RETINAL CAPILLARY CELL IN DIABETIC MOUSE MODELS
Authors: Bethany Mejia, Conager McBroom, Carson Loncarich, Lauren Wilcox, Maggie Loftin, Mariah Thomas, Erica Dotson
Northeastern State University, Tahlequah, OK
NSU Center for Tribal Studies Native American-Serving Nontribal Institutions (NASNTI) Grant
Dr. Cammi Valdez, Northeastern State University

Diabetic Retinopathy (DR) is a complication of diabetes and is a leading cause of blindness in adults. DR results from high glucose levels within the bloodstream of retinal microvasculature, which subsequently leads to acellular capillaries, microaneurysms, and abnormal blood vessels. Within our capillaries there are two cell types, endothelial cells (EC) and pericytes, that create a structure and solidity within the capillary walls. The cell structures within a non-diabetic patient are tightly regulated with a pericyte to EC ratio of 1:1. Due to high glucose levels in the blood stream of a diabetic patient, this ratio becomes 1:4, known as pericyte drop-out. Determining this ratio is done through analysis of capillary cell morphology in isolated retinal samples via elastase digest technique. Unfortunately, the ambiguity of cellular morphology in mouse samples adds challenge to quantifying capillary cells. Therefore, our lab aims to develop a new tool that will allow for detection of pericyte drop-out in diabetic mouse retinal samples. To accomplish this, we begin by dissecting the retina from mice. Then, we use elastase digest technique to isolate retinal microvasculature, and samples are adhered to a glass slide. Pericyte and EC markers are utilized for specific immunofluorescence (IF) staining of our cells of interest using a 3D printed staining device we developed. This staining device reduces the quantity of primary and secondary antibodies. Through optimization of the sample preparation, 3D staining device, and IF staining, we have been successful in labelling pericytes and EC for detection and identification.
/MONTES, JUAN - POSTER 10
POTENTIAL SINGLE FORMULA TRADITIONAL CHINESE MEDICINES THAT INCREASE INSULIN SENSITIVITY FOR TYPE II DIABETES
Authors: Juan Montes¹, Shandra Jones¹, Jonathan Ritter¹, Ying-Chou Lin², Ning Wu¹, Melody Chan³, Shih-Yin Chen³
¹Department of Biological Science, ²Department of Accounting and Finance, Southeastern Oklahoma State University, Durant, OK, USA. ³Genetic Center, Department of Medical Research, China Medical University, Taichung, Taiwan.

Type II Diabetes is a chronic metabolic disorder that is characterized by high blood sugar levels, and this is a significant global health issue that affects approximately 463 million adults worldwide. In type II diabetes the high blood glucose levels are caused by insulin insensitivity. PPAR-γ is a peroxisome proliferator-activated receptor and this protein functions as a transcription factor regulating the expression of several target genes governing adipocyte differentiation and insulin sensitivity. The purpose of this study was to identify the Traditional Chinese Medicine (TCM) single herb formulas that effectively promoted the transcription of PPAR-γ to explore a potential alternative treatment for Type II diabetes. A drug screening platform that utilized a Luciferase assay-based method was employed to explore the effectiveness of 353 TCM single formulas that would enhance the promoter region of the PPAR-γ gene. Once the 293T cells were cultured, the cells were mixed in a PGL4.17 vector containing the promoter region of the PPAR-γ gene. These cells were incubated overnight and following the transfection period the cells were then selected with a G418 antibiotic solution. Cells that were successfully transfected were sub-cultured and seeded into 96-well plates. After overnight incubation, cells were treated with a control medium, a control with 1% DMSO, and the desired 2% TCM single herb formulas. Cells that were sub-cultured had Luciferase assays performed to measure the cells' bioluminescence. The cells' light emissions were measured at 500 nm by using a Berthold Technologies Mithras LB 940 Luminometer.

/MOSELEY, KALISSA - POSTER 18
INVESTIGATING THE ROLES OF THE SAC1 GENE IN TTG2-DEPENDENT EPIDERMAL TRAITS IN ARABIDOPSIS
Authors: Kalissa Moseley, Tony Gonzalez
The Freshman Research Initiative, Department of Molecular Biosciences, SUPER Program

Basic research, like studying the epidermal traits in Arabidopsis, increases our biological knowledge and paves the way for applied research approaches. Some of the epidermal traits that our laboratory studies in Arabidopsis are trichome development, development of outer seed coat epidermal cells, and the inner seed coat Proanthocyanidin-Accumulating cells. In applied research settings, these epidermal traits can have a major impact on the development of crops as well as the ability of a crop species to protect against predators. In previously conducted research, our laboratory researched the role of AtPLC1 in the PI Lipid Signaling pathway using a process of creating a promoter-reporter gene construct and a gene overexpression construct, and subsequently plant lines containing these constructs. A similar process was used to work with the SAC1 gene that was being studied for its role in the epidermal traits of Arabidopsis. To gain a full picture of the role of the SAC1 gene, a promoter-reporter gene construct with plant lines needs to be created along with a hyperactive promoter and gene construct with plant lines. These constructs are important to potentially provide a clear picture of where the gene is active in the plant and how important the individual gene's role is in the development of the various epidermal traits in A. thaliana.
**OKEKE, CRYSTAL - POSTER 42 & ORAL**

**AN LCMS-GUIDED BIOANALYTICAL APPROACH FOR RATIONAL NATURAL PRODUCT LIBRARY DESIGN AND OPTIMIZATION**

Authors: Crystal Okeke, Monica Ness, Thilini Peramuna, and Karen Wendt

University of Scholar: The University of Oklahoma, Norman, OK, USA
Location of Research: The University of Oklahoma, Norman, OK, USA
Funding: The National Institutes of Health (NIH)
Mentor(s): Dr. Laura-Isobel McCall and Robert H. Cichewicz, The University of Oklahoma

Natural products play a vital role in drug discovery by contributing to nearly half of approved drugs either directly or by inspiring synthetic analogs. The success of drug development through high-throughput screening of compound libraries depends on their quality. However, designing natural product compound libraries pose challenges due to the redundancy in production and higher costs. To address this, evidence-based methods for optimizing natural product library design are urgently needed. Previous research by MPI showcased the use of liquid chromatography-tandem mass spectrometry (LC MS/MS) to determine the minimal number of fungal extracts required for chemical diversity. Previous research has illustrated its effectiveness using the fungus Alternaria, revealing that as few as 39 extracts could represent chemical diversity. This study extends the method’s application to broader high-throughput screening (HTS) scenarios and assesses various natural product diversification approaches systematically. Leveraging extensive metabolomics expertise, this study aims to establish evidence-based rules for library design. Through this, three distinct goals are pursued. The first goal is to demonstrate comparable diversity in focused libraries compared to random discoveries. The second goal is to evaluate co-culture’s impact on chemical diversity. Lastly, this study aims to quantify the influence of environment-mimicking conditions. This work offers a transformative approach to rational natural product library design, holding significant implications for streamlined drug development. By addressing a critical gap in library design principles, this study advances high-throughput screening, ultimately accelerating progress in public health through accelerated drug discovery.

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**OWENS, BRIEANNA - POSTER 26**

**TARGETING SPI IN TRIPLE NEGATIVE BREAST CANCER: TESTING LESS TOXIC TREATMENT OPTION**

Authors: Brieanna Owens, Christoffer Lambrigs, Umesh Sankpal, Riyaz Basha Riyaz

University of Scholar: Langston University, Langston, OK, USA
Location of Research: University of North Texas Health and Science Center, Fort Worth, TX, USA
Funding: Cancer Prevention and Research Institute of Texas (CPRIT) and Joe and Jessie Crump Foundation
Mentors: Dr. Basha Riyaz and Christoffer Lambrigs

Breast cancer ranks as the second most fatal ailment among women. Approximately 13% of women in the United States, roughly 1 in 8, will encounter invasive breast cancer in their lifetime. Two treatments for breast cancer are radiation therapy and chemotherapy; these two treatments cause harmful side effects to the patient. Enter tolfenamic acid, an anti-cancer medication devoid of steroidal and inflammatory attributes, offering potential across various cancer types. Investigations have unveiled a correlation between patient survival rates and Sp1 expression levels. Higher Sp1 expression aligns with reduced survival rates, while lower expression leads to elevated survival rates. Caucasian patients with heightened Sp1 expression exhibit superior survival rates compared to their African American counterparts with similar Sp1 profiles. This medication intervenes by suppressing specificity protein (Sp) expression. Through this action, the drug curtails the presence of Sp-dependent proteins that impede apoptosis and spur tumor growth. Consequently, tumor progression recedes as cell apoptosis is enhanced, inducing a down regulation in survivin. A key advantage lies in its heightened safety profile, amplifying therapeutic efficacy. The synergy of copper (Cu) with tolfenamic acid (Cu-TA) is explored to combat breast cancer. Capitalizing on Cu’s pivotal role in diverse biological processes, scientists have synthesized the Cu-TA compound. Targeting triple negative breast cancer lines—devoid of HER2, PR, and ER—the efficacy of Cu-TA and TA is tested.
PROTEIN H1 INCREASES COMPACTION OF TETRANUCLEOSOMES AND LEAD TO INCREASED TENSILE FORCES NANOCALIPERS GENERATE

Authors: Gregory Palomar

The quantification of the forces generated within cells is a growing field with the advent of nanotechnology. In the case of tetra nucleosomes (TNUCs), the force interactions for nucleosome compaction were not quantified. Tetra nucleosomes are a set of four nucleosomes that wrap DNA around themselves for storage during cell division. The nucleosomes are made up of two parts; a protein octamer and a piece of DNA. The protein octamers developed through biological evolution such that they attract one another for the purpose of DNA compaction for cellular division. Developing a reliable means to measure intracellular forces would allow for the advancement of finetuned nanotechnology for various research like self-replicating artificial cells. Artificial cells can take the place of tissue and blood donors depending on viability and research efforts. If an artificial replacement is to be made for nucleosomes, then programming the exact forces of compaction is imperative when reproducing a viable copy. This gap in knowledge can be filled by utilizing nano calipers that can attach to TNUCs and effectively measure the tensile force they exert on the system during compaction. Tetra nucleosomes will be attached to the nano calipers and have the compaction of the nucleosomes and the angles of the nano calipers tested under different conditions to determine the amount of force generated by the nucleosome-nucleosome interactions. One condition is simply the tetra nucleosomes connected to the nano caliper and another condition has the histone compactor protein H1 assist the TNUCs’ compaction. We observed the protein H1 treated sample to yield more compaction. By varying treatments, we quantified how much protein H1 helps in generating forces on the nano caliper as well as modulating the amount of force generated by TNUCs.

IDENTIFICATION OF AN ANTIVIRULENCE SIGNAL PRODUCED BY PSEUDOMONAS AERUGINOSA CLINICAL ISOLATES

Authors: Jake Patterson

Pseudomonas aeruginosa is a bacterium that is associated with chronic infections in Cystic Fibrosis patient’s lungs. Pseudomonas can cause an infection that slowly and progressively damages the lungs and intermittently spikes in severity (an exacerbation) doing considerable damage to the host’s lungs before returning to its more chronic state. My research focuses on a Pseudomonas clinical isolate that produces a signal that makes other Pseudomonas isolates less virulent. We hypothesize that the signal producing isolate secretes a protein or peptide that dampens virulence factors in receptive Pseudomonas aeruginosa isolates. Our goal is to isolate, identify, and characterize this secreted signal. We grew a signal producing Pseudomonas culture in liquid media to harvest the signal containing supernatant (all the liquid outside of the cells) and concentrated it by centrifugation. This was necessary for the second step: separating proteins within the concentrated supernatant through Size Exclusion Chromatography (SEC). SEC separates proteins based on size into fractions. Using these fractions, we performed plate-based assays for detecting protease production that was developed by our lab. The goal of this was to determine which fraction contains the protein or peptide that acts as the antivirulence signal. We sent the fraction that had the strongest antivirulence effect and the closest fraction that did not inhibit virulence to mass spectrometry. We used the data from this to narrow the signal down to a few candidates.
NATIVE OKLAHOMA PLANTS’ ANTIBACTERIAL PROPERTIES
Authors: Lane Paul and Dr. Leah S. Dudley

University of Scholar: East Central University, Ada, Oklahoma
Location of Research: East Central University, Ada, Oklahoma
Funding: The study was completed as part of the OK-INBRE (Oklahoma IDeA Network of Biomedical Research Excellence) under grant number P20GM103447.
Mentor: Dr. Leah S. Dudley, East Central University

Historically, plants have been used for their antimicrobial properties in medicinal practices across many different cultures. Antimicrobial resistance poses a significant global health challenge, making the exploration of alternative therapeutic strategies necessary. This study aims to investigate the antibacterial properties of plant species native to Oklahoma with the objective of identifying potential natural sources of antibacterial compounds. Tinctures were prepared from various plant organs, including stems, leaves, roots, flowers, and buds. Agar disc diffusion assays were used to test the inhibition of plant extracts as it inhibits the growth of bacteria. Among the tested tinctures, a trend in inhibition against bacteria was observed. Variations in inhibition against bacteria were observed among the tested extracts. Our findings suggest that there are potential antibacterial compounds within the extracts of native Oklahoma plants that inhibit the growth of bacteria; although, some species may deserve closer inspection than others. These results highlight the value of investigating locally produced, plant-derived sources for the development of antimicrobial products to address the growing challenge of antimicrobial resistance and the rising costs of medicine. Furthermore, the study of locally sourced, reliable alternatives may have a remarkable societal health impact for our local population and future generations.

A DOUBLE ROLLING ISOLATION SYSTEM WITH RESPONSE-BASED ADAPTIVE BEHAVIOR
Authors: Miguel Payan, P. Scott Harvey Jr., Esteban Villalobos Vega

University of Scholar: University of Oklahoma, Norman, OK, USA
Location of Research: University of Oklahoma, Norman, OK USA
Funding: OK-LSAMP, NSF (CAREER-1943917), OU College of Engineering
Mentor(s): Dr. P. Scott Harvey Jr., University of Oklahoma

Isolation systems can perform well when their displacement demands do not reach their displacement capacities. When the isolator’s displacement capacity fails to meet the demands of a disturbance, the isolator’s performance is diminished because of impacts, giving rise to high acceleration responses in isolated objects. Isolation systems can be designed to reduce impacts by reducing displacement demands and/or by increasing displacement capacity. The former objective may be realized by adhering elastomeric materials to the rolling surfaces or balls. The latter objective may be realized by increasing the size of bearing components. Seismic isolation systems should be designed to meet both objectives over a wide range of disturbance intensities, requiring response-based adaptive behavior. In this paper, a double rolling isolation system (RIS) is proposed, which exhibits response-based adaptation through engineered nonlinearities within the subsystems. The rolling surfaces profiles are tailored to stage the displacement first in the lower system at low loads and then in the upper system at higher loads. The lower system utilizes steel balls, which exhibit light rolling resistance, whereas the upper system utilizes rubber balls, which have higher rolling resistance. Therefore, light damping is realized at small displacements (i.e., under service level excitations where acceleration reduction is important), and higher damping at large displacements (i.e., under design-basis or higher excitations where displacement reduction is critical). A small-scale prototype of the double RIS was fabricated. The rolling surfaces were 3D printed. Shake table tests were performed to assess its performance under pulse-like inputs.
PETTETT, WREN O. - POSTER 7
MYCOREMEDIATION OF AGRICULTURAL RUNOFF CONTAINING NITROGEN AND PHOSPHORUS USING PLEUROTUS OSTREATUS
Authors: Wren O. Pettett
University of Scholar: Southeastern Oklahoma State University, Durant, OK, USA
Location of Research: SE Campus, Durant, OK
Funding: OK-LSAMP and McNair scholars’ program
Mentor(s): Smith, C, Southeastern Oklahoma State University

This research aims to investigate the use of mycoremediation for agricultural runoff containing nitrogen and phosphorus before it enters freshwater systems. Excessive use of fertilizers applied to crops may result in runoff that can lead to eutrophication, resulting in harmful algal blooms and depletion of dissolved oxygen in aquatic environments. Such events can severely impact aquatic ecosystems, including the recent population decline and even extinction of amphibious species worldwide. The waterborne fungal infection chytridiomycosis, has become a leading cause of amphibian deaths and extinctions due to its rampant growth in these eutrophic waterways. This study examines the use of Pleurotus ostreatus, a species of oyster mushroom, for mycoremediation due to its effectiveness in removing pollutants and acclimation to temperate regions. The study's hypothesis is that P. ostreatus can effectively remove excess nitrogen and phosphorus in agricultural runoff. The research questions include the extent of the removal of nitrogen and phosphorus by P. ostreatus in simulated agricultural runoff solutions, and the potential environmental benefits and limitations of using P. ostreatus for mycoremediation. The study will involve preparing different solutions containing the targeted nutrient, adding the solutions at differing concentrations to a container housing a filter paper colonized with P. ostreatus, allowing partial submersion, and incubating the dishes for one week. After one week, the concentration of nutrients in the solution will be measured using a refractometer and compared against a standard curve for each nutrient's current level. Research is ongoing; however, preliminary data have shown reductions in nitrate levels were achieved but not significantly reduced.

PORTER, FAITH - ORAL
SYSTEMIC LUPUS ERYTHEMATOSUS-ASSOCIATED RISK ALLELES, TASL (RS887369) AND SLC15A4 (RS1059312), SHOW STRONG GENETIC SYNERGISM AMONG LUPUS MALE SUBJECTS
Authors: Faith Porter and R. Hal Scofield, MD.

Background: Systemic lupus erythematosus (SLE) is a chronic autoimmune disease that predominately affects women, with a female-to-male ratio of approximately 10:1. However, men that develop lupus often present with more severe disease. SLC15A4, TLR7, and TASL(CXorf21) genes all contain single nucleotide polymorphisms (SNPs) demonstrating genetic association with SLE. The proteins encoded by TASL and SLC15A4 are binding partners that on the surface of the lysosome, which control lysosomal pH and regulate IFN production via the TLR7 signaling pathway, a critical driver of the disease. We predict a pleiotropic interaction between these SNPs may contribute to disease risk and/or worsen disease often observed in male SLE subjects. Our goal, through genotyping, is to assess the presence of SNPs SLC15A4 (rs1059312) (rs1385374) (rs10847697), TLR7(rs3853839), and CXorf21(rs887369) in SLE-affected and unaffected male subjects, calculate genetic synergism, and identify any correlations with a clinical phenotype. Methods: We genotyped 95 male SLE subjects (34 African American, 32 European American, and 29 Hispanic American) and 152 unaffected (33 African American, 72 European American, and 47 Hispanic American) male subjects from the OMRF Lupus Family Registry and Repository. A case-control association study was conducted on 5 SNPs TLR7(rs3853839), SLC15A4(rs1059312) (rs1385374) (rs10847697), and CXorf21(rs887369) following a real-time polymerase chain reaction (PCR) TaqMan-based allelic discrimination assay. To quantify synergy in the genetic interaction between the associated SLE risk variants we will utilize a multiplicative Synergy Index calculation to determine if the genetic interaction between the risk alleles results in larger risk in SLE than the alleles individually.
Multiple sclerosis (MS) is an autoimmune demyelinating and neurodegenerative disease of the central nervous system. MS patients that were on anti-CD20 therapy suffered a worse viral outcome during COVID-19. However, no such effects were observed in COVID-19 infected MS patients on IFN-beta therapy. Anti-CD20 and IFN-beta are MS disease-modifying therapies where anti-CD20 depletes B cells, and IFN-beta suppresses inflammatory responses but also has anti-viral properties. The objective of this study was to determine the influence anti-CD20 and IFN-b cotreatment has on influenza viral infection. The importance of this project relies on understanding the significance of cotreatment to prevent patients with autoimmune diseases from becoming worse due to viral infections. In this study, we compared the effects of anti-CD20 therapy, IFN-beta therapy and cotreatment of anti-CD20 with IFN-beta. C57BL/6 mice were treated with three doses of anti-CD20 to deplete B-cells. Next mice were infected with H1N1 influenza A Puerto/8/1934 virus (PR8) and then were treated with two doses of IFN-b. Mice were monitored daily for morbidity. Our results showed that anti-CD20 therapy increased morbidity in influenza infected mice, which was associated with increased inflammation in blood and lungs. In contrast, IFN-beta therapy improved morbidity of the infected mice but had no effect on the inflammation in the lungs. Finally, we found that addition of IFN-beta to anti-CD20 therapy during influenza infection significantly improves morbidity in mice. Overall, our data showed that IFN-beta therapy is protective in viral infections and reverses detrimental effects of anti-CD20.

Non-tuberculous Mycobacteria (NTM) infections can be greatly dangerous to patients with cystic fibrosis. Cystic fibrosis patients who get infected with NTM have a more severe reaction because NTM infection may cause hyperinflammatory damage. The goal of the study is to investigate the role of macrophage-derived microvesicles (MVs) in host response to NTM infection. MVs are extracellular vesicles that are released by mammalian cells and play an important role in cell-to-cell communication. These vesicles contain biological molecules from parental cells, including proteins, RNAs and DNAs. the Summer of 2023, dependently established a centrifugation-based MV isolation protocol using mouse macrophages, RAW 264.7, in the Dr. Yong Cheng’s lab. After MV purification, a BCA protein assay was performed to quantify the total protein in the purified MVs, to determine the effect of M.ab infection on host protein trafficking into MVs in macrophages. The purified MVs were also evaluated using the Nanosight NS300 system. The morphology (size and shape) of isolated MVs was further investigated using Transmission Electron Microscope (TEM) in the microscopy core facility at Oklahoma State University. Our results indicate that mouse macrophages released more MVs in response to Mycobacterium abscessus (M.ab) infection, one of the most common NTM species that were identified in the airway of cystic fibrosis patients. To further understand the role of MVs in macrophage response to M.ab infection, we are currently analyzing the proteome of macrophage derived the proteomics core facility. Our future study will focus on the effect of host MVs on macrophage activation during M.ab infection.
/RAMSEY, CASSANDRA - POSTER 27
CYS-CYS CROSS-LINKING IN THE F0 SECTION OF F1F0 ATP SYNTHASE

Author(s): Cassandra Ramsey and Kyle Moore

University of Scholar: Cameron University, Lawton, OK, USA
Location of Research: Cameron University, Lawton, OK, USA
Funding: OK-INBRE
Mentor: Dr. Kyle Moore, Cameron University

F1F0 – ATP synthase is an enzyme that allows for the production of ATP, an energy currency used in all living species. Subunit a of F0 section promotes the translocation of H+ protons and assists with the coupled rotary mechanism of subunit c. There is little known about the proton translocation pathway and what drives c-ring rotation. To better understand the function of the F0 section, we plan to investigate the internal structure and function of subunit a. In previous studies, a proton pathway is known to go through TMHs (Transmembrane helices) 2-5 of subunit a. Protons reach cAsp-61 in TMH2 where proton release and protonation occur. This was tested by using bismethanethiosulfonate (bis-MTS) reagents for cross-linkage between Cys substitutions in both aTMHs and cTMH. With this understanding, six substituted Cys pairs a60C/a110C, a52C/a114C, a52C/a115C, a63C/a76C, a86C/a106C, and a45C/a146C were chosen to determine cross-linkage and pH dependency within subunit a. Through fluorescence quenching it will further determine the ability for mutants to pump protons. If cross-linking occurs and/or shows pH dependency, we can formulate a new model revealing the proton translocation pathway and possible gating mechanisms that allow for c-ring rotation.

/RAY, SHAWN - ORAL
EXAMINING BIASES IN THE MEASUREMENT OF A GAMMA-RAY BURST’S ISOTROPIC EQUIVALENT ENERGY CAUSED BY INCONSISTENTLY DERIVED T90 DURATIONS

Authors: Shawn Ray, Kimberly Zoldak

University of Scholar: Oklahoma State University
Location of Research: Stillwater, OK, USA
Funding: OK-LSAMP, McNair
Mentor(s): Kimberly Zoldak, Oklahoma State University

The isotropical equivalent energy (Eiso) of a Gamma-ray Burst (GRB) is believed to be an estimation of the total energy released by the GRB’s central engine in the form of X-rays and gamma-rays. This energy is treated as if it has both physical and cosmological implications, however, its measurement may be significantly biased by the individual analyzing the data. One way in which this energy can be biased is the method for which a GRB’s T90 duration is determined. The calculation of Eiso relies on the time-integrated spectral modeling of a segment of data determined by the GRB’s T90 duration. Thus, if the T90 starting and ending times are inconsistent between two different methods, then the spectral modeling results may return drastically different results. For example, if one analyst finds a T90 duration that starts later and/or ends earlier, then their spectral modeling results will likely find a Band function profile representing a harder spectrum. Just between the telescope instrument teams, T90 derivation methods have varied. The CGRO/BATSE instrument team’s durations were derived by accumulating raw photon counts across time bins, the Fermi GBM instrument team’s durations are found by accumulating the spectrally modeled fluences within these time bins, and the Swift BAT instrument team uses the Bayesian Block algorithm. In this work we explore bias in the value of Eiso caused by simply adopting the Fermi GBM team’s T90 duration versus deriving our own T90 duration using the Bayesian Block algorithm.
**RENDON, VANESSA - POSTER 24 & ORAL**

THE IMPACTS OF INTERMITTENCY ON CRAYFISH COMMUNITY STRUCTURE

Authors: Vanessa Rendon, Benjamin T. Kelly, Dr. Lindsey Bruckerhoff

University of Scholar: Oklahoma State University
Location of Research: Oklahoma State University, Stillwater, Oklahoma, Payne County
Funding: Freshman Research Scholars Program, OKLSAMP Program
Mentor (s): Benjamin T. Kelly, Oklahoma State University, Dr. Lindsey Bruckerhoff, Ohio State University

Flow regime is a major driver of aquatic ecology. Due to increasing anthropogenic influences and altered precipitation patterns, flow regimes are changing at a rapid rate with devastating effects on ecosystems. Despite their importance to both food webs and stream structure, very little is known about crayfish communities. This is especially true in intermittent streams where collecting data is difficult due to the dramatic fluctuations in flow patterns and a lack of gauge data. We aim to assess how surface water crayfish communities shift across a gradient of intermittency to better understand how disturbances shape community structure. The study will take place in the Glover River basin of the Ouachita Mountains where the unique topography creates variations in hydrology and patterns of stream drying. Ten study sites, categorized as intermittent flashy or intermittent runoff, were chosen equidistant from the main Glover River and sampled every three months to capture changes in community structure as seasons shift. The results of this study will assist in analyzing how crayfish communities respond to disturbance and help inform decisions involving their management and preservation.

**RITTER, ANNA - POSTER 4**

ANALYSIS OF DNA AND PURIFICATION OF FLUORESCENT COMPOUNDS EXTRACTED FROM REDBUD TREES

Authors: Anna Ritter

Redbud (Cercis canadensis) seeds and flowers were eaten by Native American tribes in Oklahoma and across the US, and the bark or twigs were used to prepare medicinal drinks and for other medicinal purposes. Previous studies in our lab have analyzed some of the properties of the proteins in these tissues such as seed storage proteins, lectins, and condensed tannin- or anthocyanin related biosynthetic genes. Wood workers have used the yellowish fluorescence of redbud heartwood under UV light to identify the source of wood for small crafts, but the identity of the fluorescent compound or its properties has not been reported. We are interested in studying the yellowish fluorescent compound properties, attempting to determine its chemical structure and determining if it has antimicrobial properties. In addition, we are preparing to isolate genes encoding various proteins from redbud, for comparison to other legumes or for biosynthetic studies. For example, the unripe seeds were cooked and eaten by Native American tribes, so we would like to examine the structures of the seed storage proteins and other seed components.
This study aimed to identify Traditional Chinese Medicine (TCM) herbs that effectively promoted the transcription of PPAR-γ gene and compare the effectiveness of single TCM herb to the multiple herbs’ formula. When comparing the effectiveness of multiple formulas and the single herb, the highest drug effective ratios were compared to determine their effectiveness. The results that demonstrated that the top 50 TCMs that showed the highest gene expression were as follows from the high to low: Astragalus (Jin) (granule only) (S240), Astragalus (North) (S241), Suanzaoren (S277), Leaky reed (only made into granules) (S276), Talc (S270), Perilla (S246), Achyranthes bidentata (S237), Maimendong (S225), Dioscorea collettii (S262), Viola (S247), Cuscuta (S263), Puhuang (granule only) (S271), Kudzu root (S258), Cocklebur (S274), Asarum (S226), Mountain grapes (S26), Calamus (stone) (S257), Malt (S224), Tomatoes (S249), Lai Fuzi (S254), Japonica rice (granule only) (S269), Polygonatum (S243), Yellow eggplant (S244), Angelica (S265), Aster (S245), Mai Wei Di Huang Wan (M212), Gynostemma pentaphyllum (granule only) (S253), Herb (S273), Tinglizi (S260), Drynaria (S267), Angelica leg (granule only) (S266), Forsynthia (S231), Fossil grass (only pellets) (S45), Gardenia (water) (S233), Epimedium (S223), Dandelion (S272), Comfrey root (S248), Houttuynia cordata (S234), Chive seeds (only granules) (S261), Calamus root (S255), Ephedra root (granule only) (S228), Sang Jisheng (S236), Chenpi (S229), Poria (M163), Passepartout (S268), Gardenia (mountain) (S232), Wulingzhi (granule only) (S32), White fresh skin (S63), Shantou root (S19), Sheng Yu Tang (M262). When looking at the top 50 TCMs, the single herbs were the majority among the top 50 TCMs with the highest ratio, while multiple TCM formula counted only 3 among the top 50 TCMs. Therefore, the single herbs showed a higher effective rate than those of multiple herbs formula.

The Southern California kelp forest is a vital ecosystem, supporting a diverse group of marine species and providing for various industries. For conservation and management efforts, it is crucial for researchers to study the fishes that inhabit this ecosystem. In this study, we are focusing on the California moray eel (Gymnothorax mordax), an apex predator across Catalina Island that plays a significant role in regulating the rocky reef kelp forest. While our knowledge of the ecological significance of these elusive nocturnal predators is growing, we know little about their growth rates. We aim to investigate the recapture and growth rates of California moray eels in Marine Protected Areas (MPAs) and non-MPA sites. By utilizing the long-term monitoring data from 2012 to 2022 (excluding 2020), we will compare growth rates based on standard length (SL) and mass through recaptures including data from this year’s (2023) trapping efforts following earlier established methods by Mehta et al. (2020). Our research questions will contribute to our understanding of the ecological niche and habitat preferences of California moray eels, enabling effective conservation strategies and habitat protection. Furthermore, this study will shed light on the population dynamics of cryptic apex predators, which are essential for ecological balance and shaping local communities in the Southern California kelp forest ecosystem.
SMITH, KAYLA - POSTER 17
IMPAIRMENTS IN CEREBRAL AUTOREGULATION AND CEREBROVASCULAR REACTIVITY IN CANCER SURVIVORSHIP
Authors: Kayla Smith, Britton Scheuermann, Stephen Hammond, Shannon Parr, Vanessa-Rose Turpin, Olivia Kunkel, Carl Ade

University of scholar: Langston University, Langston, OK, USA
Location of research: Kansas State University, Manhattan, KS, USA
Funding: K-INBRE, Johnson Cancer Research Center
Mentor: Dr. Ade, Kansas State University

Roughly 46% of cancer survivors report cognitive dysfunction across many types of cancer, which has been associated with anti-cancer therapy and often results in reduced quality of life. Pre-clinical studies have suggested that the underlying factors of cognitive decline likely involve vascular dysfunction. We aimed to characterize local (cerebrovascular reactivity and cerebral autoregulation) and global (aortic arch stiffness) vascular factors in cancer survivorship. Aortic arch pulse wave velocity (aaPWV) was determined using ultrasound scans of the aortic valve and the descending aortic arch. Cerebral autoregulation was determined using Mx, a moving correlation coefficient between finger plethysmography-derived blood pressure and cerebral blood velocity of the middle cerebral artery. Higher Mx values indicate poorer cerebral autoregulation. 11 women were recruited (5 healthy controls and 6 cancer survivors who had received treatment) Cancer types included melanoma, lymphoma, and breast cancer. Age and height were similar between groups; cancer survivors tended to weigh more (p < 0.05). aaPWV was not different between groups (p = 0.1). Mx values were higher in cancer survivors. Both cerebrovascular regulatory functions were impaired in cancer survivors compared to healthy controls and decreases in cerebral autoregulation were associated with increases in aortic stiffness. The present findings highlight the importance of monitoring cerebral and global vascular function in cancer survivors who are at high-risk for cognitive decline.

SOCKEY, GAVIN - POSTER 3
REALISTIC WIND FIELD PREDICTION IN VARIOUS URBAN MORPHOLOGIES FOR APPLICATION TO SMALL UNMANNED AERIAL SYSTEMS USING DEEP LEARNING
Authors: Gavin Sockey, Rohit Vuppala, and Kursat Kara

University of Scholar: Oklahoma State University, Stillwater, OK, USA
Location of Research: Oklahoma State University, Stillwater, OK, USA
Funding: OK-LSAMP, NSF Award # 1925147
Mentor(s): Dr. Kursat Kara, Oklahoma State University

Unmanned Aircraft Systems (UAS)’ safety in densely populated urban environments is a significant concern, primarily due to the challenging atmospheric conditions and turbulent wind flow produced around architectural structures. To effectively integrate UAS into existing aerial infrastructure, enhancing the predictability of these flow conditions and developing robust wind-aware navigation systems is imperative. In this study, we comprehensively investigate the impact of building geometries on the atmospheric flow field within a simplified urban layout. The geometrical configurations we consider include standalone structures and arrays of buildings, both crucial in understanding potential implications for UAS operations. A Large-Eddy Simulation (LES) is employed to probe the unsteady and highly coherent turbulent flow structures introduced by buildings under neutral atmospheric boundary layer flow conditions. The LES methodology yields critical insights into the intricacies of urban wind dynamics and contributes to a deeper understanding of the flow phenomena around urban architecture. These acquired insights subsequently inform the development of a deep learning model for precise flow field prediction. Integrating LES-derived data with advanced machine learning algorithms augment wind-aware navigation systems for Unmanned Aerial Vehicles (UAVs), demonstrating an initial, yet crucial, stride towards safely accommodating UAS within our bustling urban aerial landscapes. This research represents an integral advancement in ensuring UAS safety and operational reliability, potentially catalyzing broader applications of UAS in densely built-up environments.
**/STEVENS, STEELLE - POSTER 29**  
**SMALL MAMMAL COMMUNITY ASSEMBLAGES IN THREATENED RIVERCANE (ARUNDINARIA GIGANTEA) HABITATS OF NORTHEASTERN OKLAHOMA**  
Authors: Steelle Stevens and Michael J. Shaughnessy Jr.  
Northeastern State University  
Tahlequah, OK 74464

Riparian zones are unique areas that support a wide range of vegetation and wildlife, many of which are restricted to that habitat. Rivercane (Arundinaria gigantea) is considered endemic to riparian areas, and while rivercane was once a predominate habitat in the southeast United States, it is now confined to flood plains and undisturbed river bottoms. Rivercane, when present, is often the dominate plant species in riparian zones. Bamboo habitats worldwide generally support a wide range of wildlife; however, little is known about the community assemblages of wildlife utilizing rivercane habitats. Small mammals play a key role in wildlife communities because they are a vital link between producers and higher trophic levels. Understanding small mammal assemblages in rivercane habitats can help us better understand the interaction between this unique habitat and its supported wildlife. This information is invaluable to effective management in these areas. We examined small mammal species composition of northeastern Oklahoma canebrakes. We also compared our results to those of inventories conducted in other regions of the southeast. Oklahoma canebrake inventories were conducted using museum special snap-trap lines. Captured small mammals were identified to species, prepared according to standard museum protocols, and installed in the Northeastern State University Vertebrate Museum. Rivercane habitats in Oklahoma supported unique assemblages of rodents and were distinct from surrounding habitats. Rivercane systems likely serve to increase regional small mammal species richness and diversity where they occur. As such, rivercane is critical habitat component within larger southeast terrestrial communities and require consideration in management practices.

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**/STRUNK, KALEN - POSTER 2**  
**REVEALING MICROBIOME-DRIVEN INDICATORS FOR ASSESSING KELP HEALTH THROUGH EXTRACELLULAR ENZYME ANALYSIS AND NUTRIENT PROFILING**  
Kalen Strunk  
USC Wrigley Institute  
Sumner REU 2023

Giant sea kelp (Macrocystis pyrifera) plays a vital ecological role, but the impact of changing environmental conditions on its physiology remains poorly understood. This study aims to investigate the correlation between the kelp's microbiome, nutritional value, and chemical composition. Recent experiments have uncovered a declining organic matter gradient along the frond, with enzyme activity showing an inverse relationship. We hypothesize that the associated microbiome influences variations in enzyme activity and nutrient profiles across the frond and different ages. Through extracellular enzyme analysis and nutrient profiling, we analyze nutrient and enzyme concentrations in various kelp frond samples to uncover phenotypic expressions influenced by the kelp’s microbiome and understand variations in enzyme activity and nutrient concentrations based on age, location, and collection sample. Anticipated results include identifying the declining organic matter gradient along the frond and an inverse relationship in enzyme activity, providing valuable insights into the influence of microbial activity on giant kelp physiology and the intricate dynamics between the kelp and its associated microbiome. This research has practical implications for optimizing kelp collection strategies, enhancing our understanding of kelp-microbe dynamics, and supporting sustainable kelp ecosystem management. By identifying microbiome-driven indicators, we contribute to the preservation and effective management of kelp forests, benefiting ecological systems and various economic sectors reliant on giant sea kelp. In conclusion, this study investigates the relationship between the microbiome, nutritional value, and chemical composition of giant sea kelp. Findings from our analysis will optimize kelp collection, enhance understanding of kelp-microbe dynamics, and support the sustainable management of kelp ecosystems, benefiting both ecological systems and economic sectors.
TEEMAN, SARAH - ORAL
EXPLORING THE EVOLUTIONARY PROCESS OF LOSING UNSELECTED GENES AS A POTENTIAL AVENUE TO ADDRESSING BACTERIAL ANTIBIOTIC RESISTANCE
Authors: Sarah Teeman

Antibiotic Resistance (AR) in bacteria is recognized as a major emerging health problem. We explore the feasibility of addressing AR by using a global rotation cycle of antibiotics. If a bacterium does not encounter an antibiotic to which it has a resistance gene, how long will it keep that gene? Retaining a “useless” gene, like an AR gene in the absence of antibiotic, may impose a fitness cost. Additionally, random mutations damaging this AR gene would not be removed by selection, resulting in gradual gene-specific erosion over evolutionary time. In this project, we explore the expectation that sustained non-use of a particular antibiotic would result in AR gene loss from pathogens, thus restoring sensitivity of the pathogen to that antibiotic. While the timescale (on-rate) for the emergence of AR in the presence of antibiotics is known, less is known about the timescale of AR gene loss (off-rate) in the absence of an antibiotic. We ran 200-generation Long-Term Evolution Experiments (LTEE) on E. coli strains with varying fitness costs to develop methods to characterize the off-rate of unused AR genes. First, we used strains designed to have a different fitness cost due to useless genes and performed direct competition experiments with these strains. Second, we used chemical mutagens at various concentrations to accelerate the rate of gene loss to a feasible timeframe. We use a gene encoding green fluorescent protein (GFP) in E. coli as a monitorable “useless gene.” Through method development in simple conditions, we pave the way for future work on quantifying the rate of loss of unused AR genes. The conceptual framework developed here can also be applied to further work on the loss of unused AR genes under real-world conditions.

TORRES, LUCIA - POSTER 19 & ORAL
GOT JAM? ANTI-JAMMING TECHNIQUE FOR RADAR USING POMDPS
Authors: Lucía Torres, Dylan Asmar, and Mykel Kochenderfer

University of Scholar: University of Oklahoma, Norman, OK, USA
Location of Research: Stanford University, Stanford, CA, USA and University of Oklahoma, Norman, OK, USA
Funding: Stanford Undergraduate Research Fellowship (SURF)
Mentor(s): Professor Mykel Kochenderfer, SISL, Stanford University and Dr. Justin Metcalf, ARRC, University of Oklahoma

The overwhelming demand for data transmission channels (bandwidth) and the lack thereof is referred to as the Bandwidth Crisis. Browsing the internet, streaming a TV show, sending a text all put strain on the limited amount of bandwidth available to us – and every day that strain pulls tighter, nearing its breaking point. To mitigate this crisis, we must find a way to efficiently share bandwidth amongst all those that use it, and we all use it. In particular, radars occupy portions of the radio-frequency spectrum. In a spectrum-sharing scenario, radar interference from other systems should be avoided as much as possible since it could severely impact the radar system. Frequency hopping in radar is a common technique where the radar changes the frequency at which it emits radio waves, but using this technique to mitigate interference is where the uncertainty lies. Partially Observable Markov Decision Processes (POMDPs) are a way to mathematically model a decision-making problem when the agent is uncertain of its environment. Formulated as a POMDP, this radar mitigation problem was implemented in the Julia programming language. The radar can only observe if it has been interfered with and, from there, must develop a strategy, generated by solving the POMDP, to avoid getting interfered with by taking an action – either to hop to a different or stay at the same frequency. Initial results showed that the optimal policy generated from the POMDP does manage to mitigate interference.
Anomaly detection within the data science field has been a flourishing field of study, especially in recent years. As the world moves into a more technologically advanced society, energy consumption is also advancing. The objective of this research is to identify a more accurate and efficient method of identifying these anomalies, while extracting micro-moment features. Previous work has been conducted consisting of different machine learning algorithms, both supervised and unsupervised algorithms, to identify these anomalies. While previous research has been successful, such as creating a Deep Neural Network with 99.58% accuracy, we wanted to see if we could find a more accurate algorithm. We used a dataset provided by Qatar University, this dataset is known as (QUD), which is a simulated dataset consisting of energy consumption data in houses. We implemented four different machine learning algorithms, two supervised and two unsupervised algorithms. Our findings indicate that the four algorithms we implemented did not perform better than previous algorithms researched, as accuracy and F1 scores of algorithms were much lower than previous algorithms.

This poster presents the process development for fabricating acrylonitrile butadiene styrene (ABS) filament that contains a percentage of aluminum powder for hybrid rocket engine 3D-printed fuel grains. Hybrid rockets use solid fuel and liquid or gaseous oxidizer such that they benefit in terms of increased safety and reduced cost and complexity and typically have a higher specific impulse than solid rocket motors but lower than liquid rocket engines. The use of a filament 3D printer to fabricate ABS fuel grains has been shown to be effective for tailoring and improving performance with potential enhancement from metal powder infused in the ABS filament; however, there is a critical need to develop a process to manufacture such filament. This study utilizes previous research that has allowed for the team to create ABS filament 1.75 mm in diameter to be produced through the use of a Filastruder and Filawinder. Along with recent work and research that has led to the capability of creating ABS filament that has a percentage of aluminum and new advancements in creating a more reliable, efficient, and consistent method of producing aluminum infused ABS.
WEBB, RYAN - POSTER 32
SYNTHESIS, PURIFICATION, AND CHARACTERIZATION OF GUEST MOLECULES IN CUCURBIT[N]URILS
Authors: Ryan Webb
University of Scholar: University of Central Oklahoma, Edmond, OK, USA
Location of Research: University of Memphis, Memphis, TN, USA
Funding: the National Science Foundation (NSF) and Oklahoma Louis Stokes Alliance for Minority Participation (OK-LSAMP)
Mentor(s): Dr. Shawna Ellis, University of Central Oklahoma

Cucurbit[n]urils exhibit a unique macrocycle capable of binding small molecules, holding promise for applications in drug delivery, molecular machines, and smart materials. The viologens employed in this research consist of pyridinium species characterized by the presence of two nitrogen atoms connected by a bridge. The focus of this work centers on investigating the supramolecular equilibrium binding modes and equilibrium binding constants between CB[n] and various viologens, a previously unstudied viologens with potential for optimization. This analysis of binding constants and modes aims to provide insights into the host-guest interactions and affinities. The findings from this study on the physical properties of these host-guest systems will contribute to the development of more complex systems, including molecular switches, molecular sensors, molecular lassos, and molecular polymers. The synthesis, purification, and characterization of the viologens, as well as the subsequent determination of binding location and affinity using established calculations from the literature, fall within the researcher’s responsibilities. The ultimate objective is to establish binding constants that will inform future experiments. Currently, both viologens have been successfully synthesized.

WOOLEN, BENJAMIN - POSTER 8
IS SCIENCE LAB WORTH IT? ANALYZING NON-SCIENCE MAJOR OPINIONS ON LAB SCIENCES IN GENERAL EDUCATION REQUIREMENTS
Authors: Benjamin Woolen
University of Scholar: Northeastern State University, Tahlequah, OK, USA
Location of Research: North Dakota State University, Fargo, ND, USA
Funding: National Science Foundation, OK-LSAMP
Mentor(s): Wil Falkner, Lisa Montplaiser

Have you found yourself taking a general education course to graduate and asking why are you wasting your time on content outside of your discipline? On average, a student’s bachelor’s degree is comprised of roughly 20% general education requirements. These courses are intended to provide robust academic and professional skills to students and engage with different perspectives on their place in the world. This project aims to investigate how students perceive natural science general education courses and their appropriateness as part of their education in an effort to improve general education courses to serve our students best. Students need to develop their skills and knowledge in science and having value to science is the first step in this development; understanding students’ values can help us further this development, turns out students have an overall supportive outlook on Gen Ed science with only a few being unsupportive, but why? We need to find out why these sentiments are occurring so we can better help these students.
The Oklahoma Louis Stokes Alliance for Minority Participation (OK-LSAMP) is a National Science Foundation (NSF) funded consortium of 12 Oklahoma colleges and universities working together to increase the number of students from underrepresented populations who earn degrees in Science, Technology, Engineering, and Mathematics (STEM) disciplines.

OK-LSAMP seeks to strengthen the preparation and representation of undergraduate students who identify as African American, American Indian, Hispanic, and Native Hawaiian or Pacific Islander, and to facilitate their successful transition to advanced postgraduate studies or the STEM workforce.

OK-LSAMP Scholars are engaged in experiential learning through research experiences in state-of-the-art labs and in locations from Oklahoma to Zimbabwe. The program provides personal, academic, and professional development opportunities throughout the year via meetings, symposiums, and workshops. Topics addressed are diverse and relevant to students’ success: finding a compatible research mentor, presentation skills, poster development, etiquette for conferences and interviews, locating and completing REU/internship applications, how to access international research experiences (iREU), graduate school preparation, and more.

The Oklahoma Louis Stokes Alliance for Minority Participation (OK-LSAMP) program (formerly OKAMP) began in 1994 when Oklahoma institutions of higher education joined forces to significantly increase the recruitment, enrollment, and retention of underrepresented minority students in STEM disciplines. The program was made possible through the NSF’s recently established OKAMP program. The program was later renamed LSAMP in recognition of retired Ohio Congressman Louis Stokes, who is responsible for the establishment of numerous minority-focused NSF and National Institute of Health (NIH) programs.

The Louis Stokes Alliance for Minority Participation (LSAMP) is named in honor of Louis Stokes, an African American political voice, and former congressman. Stokes was born in Cleveland, Ohio in 1925 and was educated in the Cleveland Public Schools. In 1968, Stokes was elected to become the first African American member of Congress from the state of Ohio. He served in the U.S. House of Representatives as a member of the Democratic party for 15 consecutive terms until 1998. He maintained a quest for civil rights, equality, and social and economic justice throughout his tenure in the United States Congress. Stokes was also a founding member of the Congressional Black Caucus.
Dr. Jason F. Kirksey is the Vice President for Institutional Diversity and the Chief Diversity Officer at Oklahoma State University (OSU). He also holds the rank of Associate Professor in the OSU Department of Political Science. Previously, Kirksey held the Hannah D. Atkins Endowed Chair for Political Science and Government Information as an assistant and associate professor in the OSU Department of Political Science from 1995-2010, served as the Director of the OSU Center for Africana Studies (2007-2011), and was President of the Oklahoma Political Science Association (2002). Kirksey was the first African American at OSU to hold an endowed chair.

Kirksey has served as PI (principal investigator) for approximately $10M in National Science Foundation (NSF) funding at OSU. During his 14-year tenure as Vice President he also provided administrative oversight of an additional $11M in NSF and U.S. Department of Education projects serving students from historically underrepresented groups, first-generation, low-income, and students with disabilities. Most recently, Kirksey serves as co-PI on a $3.75M U.S. Department of Energy grant in the OSU College of Engineering, Architecture, and Technology.

His academic areas of expertise include minority politics; race, politics, and sports; and public policy, with emphasis on African Americans, Native Americans, and women in the American political system. Kirksey’s published research appears in the National Political Science Review, Women and Politics, the Voting Rights Review, Focus on Law Review, and Oklahoma Politics. He has also written several book chapters, focused primarily on the Voting Rights Act of 1965. Additionally, he has served as a federal court-certified expert witness in voting rights cases.

He holds a BA in both Political Science and Economics (1989) and an MA in Political Science (1991) from OSU, and a Ph.D. in Political Science from the University of New Orleans (1997). He is also a 2014 graduate of Class XXVII of Leadership Oklahoma.

Over a decade of Kirksey’s leadership resulted in the Division of Institutional Diversity playing an integral role in OSU being recognized with numerous accolades, including the recently awarded prestigious Journal Record “Power List Leaders in Workplace Diversity 2023” in Oklahoma. Additionally, OSU is one of seven four-year schools in the nation to have earned the HEED Award eleven consecutive years.

- 2012-2022 Higher Education Excellence in Diversity (HEED) Award
- 2016 NADOHE Institutional Excellence Award
- 2016 Southwest Minority Supplier Development Council Corporation of the Year Award
- 2017-2022 HEED Award Diversity Champion
- 2016-2018 Minority Access, Inc. Institution Committed to Diversity Award
- 2016 and 2017 Tulsa Chamber Mosaic Five-star Inclusive Workplace Culture Award
- 2017 AAAED’s Dr. Roosevelt Thomas Champion of Diversity Award
- 2018 The Society for Diversity Innovation + Inclusion Leadership Award
- 2018-2022 Military Times Top 100 schools for Veterans
- 2019 Honorable Mention NCAA Diversity and Inclusion Award
- 2017 NADOHE Dr. Frank W. Hale, Jr. Distinguished Service Award (Kirksey)
- 2018 APLU CADE Distinguished Service Award (Kirksey)
- 2021 Inclusive Excellence Leadership Award from Diversity & HR Solutions (Kirksey)
- 2023 Diamond Award Excellence in Education Leadership (Kirksey)
- The Journal Record “Power List Leaders in Workplace Diversity 2023” in Oklahoma

In 2014, Kirksey embarked on an unconventional and unprecedented capital campaign at OSU. The five-year campaign focused on engaging OSU alumni of color, primarily African Americans, to develop private program support and resources, in particular scholarships, focused on diversity and inclusion. The campaign total is currently just under $7M and yielded over 50 new endowed scholarships.

Kirksey has served on numerous boards and leadership councils and is a native of Denver, Colorado.
Nicole Colston, Ph.D., Research Co-PI
405-744-3840, nicole.colston@okstate.edu

Dr. Nicole Colston is co-PI and Lead Researcher for the OK-LSAMP Program. Colston is an Assistant Research Professor in the Natural Resource and Ecology Management (NREM) Department at Oklahoma State University. For nearly 10 years, she has been working to support Native American participation in K-20 STEM education in Oklahoma. She is a network scholar with several projects focused on STEM capacity in Indian Country. As lead researcher, she works with the OK-LSAMP Research Team to examine the role of programming on student identity development and career thinking.

Gina Miller, State Program Director
405-744-6710, gina.miller@okstate.edu

Gina Miller is Director of the Oklahoma Louis Stokes Alliance for Minority Participation program (OK-LSAMP). In her role, she supports a consortium of twelve Oklahoma colleges and universities working to increase the number of underrepresented students graduating with STEM degrees. Gina uses her education and communications background to advocate for underrepresented, underserved, and marginalized students (UUMs) on Oklahoma’s higher education campuses. She attended OSU as a first-generation, non-traditional student and received a Bachelor of Arts in Journalism with a Public Relations emphasis. Since graduating in 2005, she has dedicated herself to improving educational experiences for students. In 2009, she began her service at OSU as the Outreach Coordinator for a National Science Foundation-funded grant award, where she worked until joining the Division of Institutional Diversity team in 2023.

Darlene Croci, Grant Coordinator
405-744-7820, darlene.croci@okstate.edu

Darlene received her BS degree in Human Environmental Sciences from Oklahoma State University (OSU) in 1991. Upon graduation, she began working for OSU serving in various roles across campus. Darlene worked for 5 years for the Oklahoma Department of Career and Technology Education before returning to OSU in 2004. She served a five year term on the OSU Staff Advisory Council (SAC) - 2010-2015. Darlene became Grant Coordinator for OK-LSAMP September 2015.

Dr. Nicole Watkins

Dr. Watkins is the outside evaluator for OK-LSAMP. She is the Director of the Center of Institutional Data and Exchange (C-IDEA) and the Director of the Consortium for Student Retention and Data Exchange (CSRDE) housed on the research campus at the University of Oklahoma. She is the Events Director for the annual National Symposium on Student Retention (NSSR). She currently serves as the Executive Director of OASCD, the Oklahoma Association for Supervision of Curriculum Development, and is the Co-Owner of Building Capacity EDU (BCEDU), an educational consulting company. Dr. Watkins has served in public education for 25 years as a teacher, professor, consultant, grant director, and professional development coordinator at entities such as the K20 Center and the State Department of Education.
Dr. Alimamy Fornah received a BS and MS in Agronomy from Njala University, MS and Ph.D. in Soil Nutrient Management with an emphasis on soil fertility from Oklahoma State University. He is currently an Assistant Professor of Agriculture at Cameron University and the agronomist of the Cameron University farm. Dr. Fornah’s research interests include precision agriculture, soil fertility, and soil nutrient management. He is also interested in delivering appropriate plant management systems to improve crop production.

Dr. Williams earned a BS in Physics and Mathematics from Arkansas Tech University, a MS in Physics from the University of Arkansas, and a Ph.D. in Physics Education from The University of Oklahoma. Her research interests are varied from how students learn physics to ultrasound physics to applying photothermal deflection spectroscopy to the analysis of species in a flame. She is an American Association of Physics Teachers Fellow, Vice Chair Physical Sciences Section and Recording Secretary for the OK Academy of Science and Professor in the Physics Department at East Central University.

Dr. Lewis has a BS in zoology from Howard University as well as an MS in chemistry and a Ph.D. in chemistry/biochemistry from the University of Oklahoma. Her research interests include bioinformatics of bipolar disorder and asphalt chemistry. Currently, Dr. Lewis serves as an Associate Professor of Chemistry.

Jorge graduated with Ph.D. in Environmental Engineering from the University of Arizona in December 2014. Jorge joined the School of Civil and Environmental Engineering at Oklahoma State University as an Assistant Professor and continued to establish his lab, Gonzalez-Estrella Environmental Engineering (GE3) research group, in the Fall 2020. Dr. Gonzalez-Estrella’s research group is focused on fate and effect of emergent and perseverant contaminants on engineered and natural water systems and terrestrial ecosystems.
Oklahoma Panhandle State University

**Ryan Blanton**, Ph.D., 580-349-1550, rblanton@opsu.edu

Dr. Blanton has a BA, MA, and PH.D. in anthropology, all from the University of Oklahoma. With a specialization in linguistic and medical anthropology, his research focus is the intersections of discourse, identity, and health. Past research projects include environmental racism, health inequality, and rural health economics and development. Dr. Blanton is the Vice President of Operations at Oklahoma Panhandle State University.

Northeastern State University

**Namdi Ekesi**, Ph.D., 918-444-3828, ekesi@nsuok.edu

Dr. Ekesi received a BS in Biology from Ashford University and a Ph.D. in Cellular Molecular Biology from the University of Arkansas. His research concentration is on host-pathogen interaction. Some on-going projects in his lab include (i) uncovering the mechanisms of acquisition of virulence by Staphylococcus species, (ii) exploring host defense peptides as therapeutic alternatives to conventional antibiotics, among others. Dr. Ekesi is a faculty member in the Natural Sciences department at Northeastern State University.

Northwestern Oklahoma State University

**Tim Maharry**, Ph.D., 580-327-8583, tmaharry@nwosu.edu

Dr. Maharry has a BA with distinction in mathematics from Hastings College as well as an MS in applied mathematics and a Ph.D. in statistics from Oklahoma State University. His research interests include math education, statistical literacy, and numerical analysis. Currently, Dr. Maharry serves as Chair and an Associate Professor in the Department of Mathematics and Computer Sciences.

Southeastern Oklahoma State University

**Ning Wu**, M.D., 580-745-2564, nwu@se.edu

Dr. Wu received his M.D. and Master of Medicine in Imaging Pathology from Capital Medical University, and his M.S. in Molecular Physiology from State University of New York at Stony Brook. His research interests include studying the molecular genetical mechanisms of human major depressive disorder, epidemiological investigation of populational based human diseases, and improving the learning and scientific inquiry skills of the undergraduate students in pre-health and biomedical courses. Dr. Wu is a Professor in the Department of Biological Sciences and a member of Oklahoma State Anatomical Board.
**Southwestern Oklahoma State University**

**Tim Hubin,** Ph.D., 580-774-3026, tim.hubin@swosu.edu

Dr. Hubin received a BS in chemistry and a BS in secondary science education from Kansas State University and worked as a postdoc at Caltech. Currently, he is working on the development and screening of transition metal complexes as drug molecules for several diseases including cancer, HIV, malaria, and fungal infections. He is also continuing a long-term project on “green” oxidation catalysts able to work in water and produce only water as byproduct. Dr. Hubin has received several awards for combined teaching and research accomplishments, including Oklahoma awards as a DaVinci Scholar and the Oklahoma Medal for Excellence, as well as the national award designation as a Henry-Dreyfus Teacher-Scholar.

**University of Central Oklahoma**

**Greg Wilson,** Ph.D., 405-974-3497, gwilson@uco.edu

Dr. Wilson has a BA in biology from Central College, an MS from Fort Hays State University, and a Ph.D. in zoology from Oklahoma State University. His research interests include using molecular techniques to investigate questions relating to genetics, phylogeography, molecular ecology, and systematics in an array of organisms, especially mammals. He is particularly interested in how heterogeneous landscapes impact contemporary genetic structure of extant populations. Currently, Dr. Wilson is the Assistant Vice President, Office of Research and Grants and a Professor in the Biology Department.

**University of Oklahoma**

**Liz Karr,** Ph.D., 405-325-3811, lizkarr@ou.edu

Dr. Liz Karr is the Associate Dean of the Graduate College at the University of Oklahoma. She is also an Associate Professor of Microbiology. In her role as Associate Dean, Dr. Karr supports many aspects of the Graduate College’s mission. She works with postdocs, LSAMP scholars, graduate students facing challenges and obstacles to degree completion and works on policy reform and program climate issues to improve the graduate student experience.

**University of Tulsa**

**Syed Raziullah Hussaini,** Ph.D., 918-631-2228, syed-hussaini@utulsa.edu

Dr. Razi is an Associate Professor in the Department of Chemistry and Biochemistry at the University of Tulsa. His research interests include medicinal chemistry, synthetic methodology, total synthesis of natural products, materials chemistry, electrosynthesis, and chemical education. Razi has worked with more than 60 students, ranging from visiting scholars to High School students, and authored 28 publications.