Oct 3rd 2020

VIRTUAL

OK-LSAMP 26th ANNUAL RESEARCH SYMPOSIUM

The Louis Stokes Alliance for Minority Participation

DIVISION OF INSTITUTIONAL DIVERSITY

Award
NSF HRD-1911370

ok-lsamp oklsamp www.ok-lsamp.okstate.edu

CONFERENCE PRESENTATION OPPORTUNITIES

Scholars are strongly encouraged to present research at the following conferences.

34th Annual National Conference on Undergraduate Research

California State University

April, 2021

Oklahoma Research Day

March 2021

Cameron University, Lawton, Oklahoma

www.oklahomaresearchday.com/

SACNAS 2021

Kansas City, Missouri

October 28 - 30

https://www.sacnas.org/what-we-do/conference/

OK-LSAMP 26th Annual Research Symposium

AGENDA

October 3, 2020 Hosted by Oklahoma State University LSAMP

Posters will be available for viewing and questions until Sunday, October 4, 2020*

9:00 AM - 9:15 AM	Opening Remarks and Introductions	Brenda L. Morales, OK-LSAMP Director Jason F. Kirksey, PhD, OK-LSAMP Principal Investigator Vice President for Institutional Diversity, Oklahoma State University	Zoom Meeting*
9:15 AM-10:30 AM	Keynote Address	Ngozi Ubani Ochoa, PhD University of Texas El Passo LSAMP Bridge to the Doctorate & LSAMP Alum	Zoom Meeting*
10:30 AM-12:00 PM	Oral Presentations	*For Specific Times, See "Presentations Listed Alphabetically"* Biochemistry, Biology & Ecology Microbiology & Entomology Physics, Mathematics & Engineering	Microsoft Teams Rm 1* Microsoft Teams Rm 2* Microsoft Teams Rm 3*
12:00 PM - 1:00 PM	LUNCH BREAK (on your own)		
1:00 PM - 2:00 PM	Workshop	**Graduate School Preparation & Tips Panel** Moderator: Cammi Valdez, PhD; Panelists: Ana Chicas-Mosier, PhD, Karina Flores, Ashlee Hawkins, Matthew Maxwell and Jesse Velasco	Zoom Meeting*
2:00 PM - 2:30 PM	Awards Presentation & Closing Remarks	1st, 2nd, and 3rd Place Presentations Life Science Poster Presentations Non Life Science Poster Presentations Oral Presentations Jovette Dew, PhD, Assistant Vice President for Institutional Diversity, Oklahoma State University	Zoom Meeting*

*** Links and meeting numbers for Zoom and Microsoft Teams have been sent directly to all registered participants.**

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KEYNOTE SPEAKER

Dr. Ngozi Ubani Ochoa is a Mission Systems Design Engineer at Lockheed Martin Aeronautics in Fort Worth, Texas. She works on avionic system architecture and design for fighter jet capabilities that support the cockpit environment, data security, datalink communication and sensors. She is also involved in virtual training and combat air modernization research with Advanced Development Programs. Before her work at Lockheed, she worked at the NASA White Sands Test Facility in Las Cruces, New Mexico. As a co-op, she conducted failure analysis of critical aerospace systems and conducted research on additively manufactured aerospace materials. Her background also includes work at Holloman Air Force Base in Alamogordo, New Mexico as a rocket sled engineer intern and at Vallourec Star in Houston, Texas as and as a Pipe Heat Treat Process engineer intern.

Dr. Ubani Ochoa's doctoral research, conducted in the Center for the Advancement of Space Safety and Mission Assurance Research, involved a microstructural examination of debris components obtained from the Space Shuttle Columbia accident. She investigated the effect of atmospheric re-entry on the self-ignition and combustion behavior of aerospace alloys and presented her work at the 27th Advanced Aerospace Materials and Processes Conference in 2014 and at the 10th International Association for the Advancement of Space Safety Conference in 2019. In addition to this research, she also serves as second author of "Failure analysis of a structural sub-assembly from a slimes filter press," a technical paper published in the Journal of Failure Analysis and Prevention. She also contributed as second author of "Ignition of Metals in Heated Supersonic Particle Impact with Inert Particulate", a paper to be presented October 2020 at the 15th International Symposium on Flammability and Sensitivity of Materials in Oxygen-Enriched Atmospheres. Her current research interests include applied electromagnetics, remote sensing and failure analysis of advanced materials.

While pursuing her doctorate, she worked as a graduate teaching assistant, during which time she developed a strong passion for academia. After her teaching assistant work, she continued to teach as a private tutor and participated in a graduate mentorship with Aspire, a program that seeks to develop inclusive and diverse STEM faculty across the nation. Dr. Ubani Ochoa currently serves as a college mentor and actively pursues community engagement opportunities with programs that aim to increase underrepresented minority contribution in the field of science, technology, engineering and math.

She holds a bachelor's degree in Spanish from The University of Texas at Austin, as well as a bachelor's degree in Industrial Engineering from the University of Texas at El Paso (UTEP) where she also earned her Ph.D. in Materials Engineering. In graduate school, she was member of the Alpha Sigma Mu Honor Society and was a 2014 – 2016 Louis Stokes Alliance for Minority Participation, Bridge to the Doctorate fellow. After obtaining her doctorate, Dr. Ubani Ochoa completed all master's coursework in Systems Engineering at UTEP and is currently working on her thesis. She lives in the DFW area and enjoys spending her free time playing board games, cooking and watching TV.

Graduate School Preparation & Tips Panel ***1:00pm -2:00pm***

Moderator:

Cammie Valdez, PhD

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 and President of the national McNair Association of Professionals (MAP). Previously, Dr. Valdez served as the Director of the McNair Scholars Program at Wellesley College and as Assistant Director of Research and Fellowships at Harvard College.

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 PhD in Biological Chemistry and Molecular Pharmacology from Harvard University. During graduate school, her scholarship and work was 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.

Panelists:

Ana Chicas-Mosier, PhD

Dr. Ana Chicas-Mosier received Bachelors of Science degrees in Biology and Psychology and her PhD in Zoology from Oklahoma State University in 2015 and 2020, respectively. Her dissertation focused on the mechanisms and consequences of metal exposure in honey bees. During her doctoral program, Dr. Chicas-Mosier was awarded National Science Foundation Graduate Research and Bridge to the Doctorate Fellowships. Now a Postdoctoral Fellow at Auburn University, Dr. Chicas-Mosier is studying visual biases in parasitoid wasps in the Fadamiro laboratory. Dr. Chicas-Mosier is a strong advocate for improving representation in STEM fields through outreach and discussion, and her love of the outdoors has fostered her love for entomology.

Karina Flores

Karina is a first-generation, first-year PhD student at the Sackler Institute of Graduate Biomedical Sciences at New York University. She is a recent alumnus from the University of Oklahoma where she studied Biology. Karina began her college career as a pre-med student but quickly realized she enjoyed conducting research. She then sought out additional opportunities to enhance her research experience at OU like partaking in campus programs and organizations such as OK-LSAMP, SACNAS, and McNair. After a semester in the lab at the Sam Noble Museum of Natural history, she joined the lab of Dr. McCall researching Chagas Disease, a parasitic disease endemic to Central and South America. Currently, Karina is taking her graduate courses online due to COVID-19 but expects to move to NYC starting in January 2021.

Matthew Maxwell

Matt is a citizen of The Choctaw Nation of Oklahoma and a third-year PhD student studying cancer biology at The University of California, San Diego and The Salk Institute. Matt is also an NSF GRFP and HHMI Gilliam fellow and co-leads the UCSD chapter of The American Indian Science Engineering Society (AISES). He completed his bachelor's degree in Biochemical Technology from Southeastern Oklahoma State University in May 2018. Matt's research focuses on how mutations in certain commonly mutated genes in cancer effect therapeutic responses to cancer immunotherapies and chemotherapies. Beyond his scientific training, Matt hopes to become a principal investigator at a research-intensive academic institution and build community among fellow Native Americans in STEM.

Ashlee N. Hawkins

Ashlee is a third year Master's student and BD fellow, pursuing Microbiology in the Department of Microbiology and Molecular Genetics at Oklahoma State University. Ashlee completed her bachelor's degree in Microbiology in May of 2018 and is expected to finish her Master's degree this coming Spring of 2021. Ashlee conducts infectious disease research within a medical mycology lab. Her research project analyzes the opportunistic intracellular fungal pathogen C. neoformans and it's interactions with cellular components of innate immunity. This semester Ashlee has earned a medical school acceptance and hopes to continue research throughout her medical career as she is determined to mitigate the effects of health disparities within underrepresented communities and ethnic minorities.

Jesse N. Velasco-Silva

Jesse is a first-generation Mexican immigrant and college student. He is an OK-LSAMP alumnus and former undergraduate student of Southwestern Oklahoma State University, where he completed his bachelor's degree in biology in 2018. He is a current Ph.D. candidate at the University of Utah. His thesis project involves studying amino acid metabolism *in vivo.* He applies mass spectrometry and CRISPR/Cas9 genetic engineering to understand the fundamental metabolic processes underlying cellular disease physiology as occurs in cancer and diabetes. Outside of the lab, Jesse is actively involved in diversity-promoting and supporting organizations like SACNAS. He also serves as a student ambassador for the Bioscience Ph.D. program at the University of Utah. He loves to travel, enjoy hiking, biking, and ski. Jesse aims to become an independent biomedical researcher and diversity ambassador to advocate for a more inclusive scientific workforce and community.

LOUIS STOKES & LSAMP

In 1991, the National Science Foundation created six multi-institutional Alliance for Minority Participation (AMP) programs. In 1998, **Congressman Louis Stokes'** name was added to the program.

Congressman Stokes passed away 2015. The LSAMP community and the nation has lost a great man. You can read all about Congressman Stokes' career at:
http://history.house.gov/People/Detail?id=22311

Dr. A. James Hicks was named LSAMP program director in 1997. He received a Ph.D. in biology from the University of Illinois at Urbana and additional training at Harvard University, the National Institutes of Health, and the Missouri Botanical Gardens. When Dr. Hicks took over LSAMP, there were 25 Alliances in the nation. Today, there are more than 40 active LSAMP alliances with over 800 colleges and universities involved in increasing the quality and quantity of students from underrepresented populations who receive degrees in science, technology, engineering, and mathematics.

A Brief History of OK-LSAMP

In 1992, the Oklahoma State Regents organized the Oklahoma Alliance for Minority Participation in Science, Engineering, and Mathematics (OKAMP SEM). Dr. Earl Mitchell, Oklahoma State University (OSU) Professor, was chosen to serve as Chair of the Alliance. In 1993, Dr. Mitchell, with the help of Dr. Ann Ackerman from South Oklahoma City Junior College, wrote and submitted an AMP proposal to the National Science Foundation (NSF). Included in the proposal was additional matching support for the program at the regional universities provided by the Oklahoma State Regents for Higher Education. In 1994, OSU, as the lead institution, along with seven partner institutions was awarded the grant. The OKAMP program was established to address the critical undersupply of minority students pursuing BS degrees in Science, Mathematics, Engineering, and Technology (SMET).

Today, 12 Oklahoma institutions of higher education make up the Oklahoma consortium. Through the years, many changes have been made including the addition of Congressman Louis Stokes' name to the AMP programs nation-wide, and the change of SMET to Science, Technology, Engineering, and Mathematics (STEM). A graduate school initiative - the Bridge to the Doctorate (BD) program was implemented with Oklahoma providing graduate support for 9 cohorts of BD Fellows since the BD initiative began.

Throughout the 2019-2020 academic year, the Oklahoma Alliance increased the number of scholars to 280 from 267 in the 18-19 academic year. Of those 280 Scholars, 84 completed Bachelor of Science degrees and 30 of the 84 graduates were admitted to graduate programs, a total of 35% of the scholars. During the 2019-2020 academic year 149 (53%) of the Alliance scholars participated in research activities, and 26 of the scholars participated in international research experiences at 23 locations. Due to COVID-19, the spring semester affected our scholars research, international experiences, conference presentations and internships. Despite the cancelation of many activities, OK-LSAMP worked with scholars to ensure they were able to acquire experiences that would allow them to be prepared and competitive for graduate school.

ADMINISTRATION

Oklahoma State University, Lead Institution

Jason F. Kirksey, Ph.D., Principal Investigator
405-744-9154, jason.kirksey@okstate.edu
Dr. Kirksey is the Vice President for Institutional Diversity at Oklahoma State University (OSU). In this role, he serves as the chief diversity officer for the entire OSU system. In addition, Dr. Kirksey serves as Associate Professor in the Department of Political Science. His research interests include minority politics (especially African American and women), urban politics, the election system, and American government.

Brenda L. Morales, M.S., Director
405-744-6710, brenda.morales@okstate.edu
Brenda received her B.S. degree from the University of Texas Pan-American, which led her to Oklahoma State University through a National Science Foundation - Research Experience for Undergraduates (NSF - REU). In Fall 2002 she made Oklahoma State University her choice to pursue a Master of Science degree in Psychology. She became Director of the OK-LSAMP program and the Bridge to the Doctorate program in 2016. The OK-LSAMP program is a consortium of 12 Oklahoma colleges and universities in which Brenda oversees the day-to-day and long-term activities associated with the NSF grant.

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.

Sandra Whalen., Program Evaluator
405-325-2158, swhalen@ou.edu
Sandra received her M.Ed. In Adult and Higher Education from the University of Oklahoma and is Director of the Center for Institutional Data Exchange and Analysis (C-IDEA) at the University of Oklahoma. One of the main functions of the center is to coordinate the Consortium for Student Retention and Data Exchange (CSRDE). She has helped transition the CSRDE from solely a data exchange group to a national organization supporting higher education institutions interested in improving the success of their students. Sandra was instrumental in establishing the National Symposium on Student Retention in 2005, and creating the CSRDE monthly webinar series in 2007. Under her leadership, the CSRDE published "Building Bridges for Student Success: A Sourcebook for Colleges and Universities" in 2003.

CAMPUS PROGRAM MANAGERS

Cameron University

Von Underwood, Ph.D., 580-581-2491, vonu@cameron.edu

Dr. Von Underwood is the current Dean of the School of Arts and Sciences at Cameron University. He teaches world literature courses for the Department of Communication, English, and Foreign Languages. He has a Ph. D. in Comparative Literature from the University Professors' Program at Boston University, an A.M. in Creative Writing from Boston University, and a B.A. in International Studies and Philosophy from University of North Carolina at Chapel Hill.

East Central University

Karen Williams, Ph.D., 580-559-5394, kwilliams@ecok.edu

Dr. Williams earned a BS in Physics and Mathematics from Arkansas Tech University, a MS in Physics from the University of Arkansas, and a PhD 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.

Langston University

Sharon Lewis, Ph.D., 405-466-3316, lewissa@langston.edu

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.

Oklahoma State University

George Brusch IV, Ph.D., 405-744-9680, gbrusch@okstate.edu

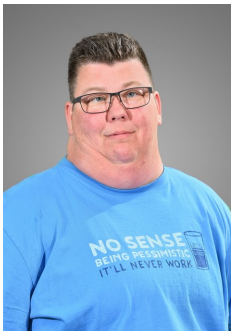
George received a BS in biology from California Polytechnic State University, San Luis Obispo and PhD in biology from Arizona State University. His research uses integrative methods to answer questions regarding animals that live in environmental conditions where resources are limited, specifically water. He is also passionate about outreach efforts and spending time with his wife and two daughters. He is currently an assistant professor in Integrative Biology at OSU.

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



Jody Buckholtz, Ph.D., 918-444-3839, buckholt@nsuok.edu

Dr. Buckholtz received a BS from the University of Central Arkansas and an MS and Ph.D. from the University of Arkansas. Her research interests include electrochemistry-oxygen reduction reaction catalysis, construction of reference electrodes for use in nonaqueous solutions, nitrate determination in rural well-water supplies, and ionic liquid uses as solvents for cellulose degradation. Dr. Buckholtz is an Associate Professor AISES Advisor and Supplemental Instruction Coordinator.

Northwestern Oklahoma State University

Tim Maharry, Ph.D., 580-327-8583, tjmaharry@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

Rodney Bates, Ph.D., 405-325-7407, rbates5@ou.edu

Dr. Rodney Bates is Director of Graduate Student and Postdoc Retention and Support in the Graduate College. Dr. Bates supports many aspects of the Graduate College's mission by providing direct mentorship and coaching to graduate students and postdocs, working with academic units to improve their climates, providing workshops and training to faculty, and enhancing the Graduate College's ability to recruit, support, and retain students and postdocs from historically underrepresented groups.

University of Tulsa

J. C. Diaz, Ph.D., 918-631-2228, diaz@utulsa.edu

Dr. Diaz has a BS in mathematics from Universidad de los Andes and a MA and Ph.D. from Rice University. His research interests include human computer interaction, informational technology, and robotics. One of Dr. Diaz's accomplishments is a yearly summer robotics workshop for high school students for which OK-LSAMP Scholars from the University of Tulsa have served as mentors.

ORAL PRESENTATIONS

Listed Alphabetically

First Name	Last Name	Univ	Discipline	Time	Microsoft Teams Session
Saramarie	Azzun	OU	Social & Behavioral Sciences	10:35 - 10:50	Biology, Biochem & Ecology
Kellan	Brown	ECU	Physics	10:35 - 10:50	Physics, Math & Engineering
Stormie	Dreadfulwater	OSU	Microbiology	10:35 - 10:50	Microbiology & Entomology
Samuel	Heard	OU	Mathematics	10:55 - 11:10	Physics, Math & Engineering
Brandy	Herrera	OU	Mathematics	11:15 - 11:30	Physics, Math & Engineering
Duncan	Merchan Breuer	OU	Mechanical Engineering	11:35 - 11:50	Physics, Math & Engineering
Casandra	Salinas	OSU	Microbiology	10:55 - 11:10	Microbiology & Entomology
November	Sankey	OSU	Microbiology	11:15 - 11:30	Microbiology & Entomology
Heath	Steward	OSU	Natural Resource Ecology	10:55 - 11:10	Biology, Biochem & Ecology
Autumn	Sutton	OSU	Entomology/Plant Pathology	11:35 - 11:50	Microbiology & Entomology
Caleb	Watson	ECU	Molecular Biology	11:15 - 11:30	Biology, Biochemi & Ecology
Marissa	Wilson	LU	Biology	11:35 - 11:50	Biology, Biochemi & Ecology

ORAL PRESENTATIONS

Listed by Room Number

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Saramarie	Azzun	OU	Social & Behavioral Sciences	10:35 - 10:50	Biology, Biochem & Ecology
Heath	Steward	OSU	Natural Resource Ecology	10:55 - 11:10	Biology, Biochem & Ecology
Caleb	Watson	ECU	Molecular Biology	11:15 - 11:30	Biology, Biochem & Ecology
Marissa	Wilson	LU	Biology	11:35 - 11:50	Biology, Biochem & Ecology
Stormie	Dreadfulwater	OSU	Microbiology	10:35 - 10:50	Microbiology & Entomology
Casandra	Salinas	OSU	Microbiology	10:55 - 11:10	Microbiology & Entomology
November	Sankey	OSU	Microbiology	11:15 - 11:30	Microbiology & Entomology
Autumn	Sutton	OSU	Entomology/Plant Pathology	11:35 - 11:50	Microbiology & Entomology
Kellan	Brown	ECU	Physics	10:35 - 10:50	Physics, Math & Engineering
Samuel	Heard	OU	Mathematics	10:55 - 11:10	Physics, Math & Engineering
Brandy	Herrera	OU	Mathematics	11:15 - 11:30	Physics, Math & Engineering
Duncan	Merchan Breuer	OU	Mechanical Engineering	11:35 - 11:50	Physics, Math & Engineering

ORAL PRESENTATION ABSTRACTS

Biology, Biochem & Ecology
10:35-10:50

AUDITORY NEURAL OSCILLATION PATTERNS AS BIOMARKERS IN FRAGILE X SYNDROME AND AUTISM SPECTRUM DISORDER

Author(s): **Saramarie Azzun**, Nicholas E. Woodruff, and Lauren Ethridge, Ph.D.
University of Scholar: The University of Oklahoma, Norman, OK, USA
Location of Research: The University of Oklahoma, Norman, OK, USA
Funding: National Institute of Mental Health and National Institute of Child Health and Human Development (NIMH/NICHD), Autism Speaks, and the Oklahoma Louis Stokes Alliance for Minority Participation (OK-LSAMP)
Mentor(s): Lauren Ethridge, Ph.D., The University of Oklahoma

While Fragile X Syndrome (FXS) is a genetic disorder that causes intellectual disability, Autism Spectrum Disorder (ASD) is one of the most common social impairments and is often a co-morbidity of those diagnosed with FXS. Measuring sensory hypersensitivity is a shared symptom of these disorders, and dense-array electroencephalograms (EEGs) can quantify the symptomatic brain activity for diagnosis. Based on the findings of a 2019 study from Dr. Lauren Ethridge, brain wave measurements – such as gamma power, inter-trial coherence (ITC), event-related potential, alpha power, and theta power – and their abnormalities found in FXS are hypothesized to appear in a subset, and the ASD oscillation patterns would be similar to these findings. The subset of subjects was compared from the original ASD and Fragile X study with three groups: those with ASD, those with FXS, and typically developing controls (TDC). An auditory task was used as to gauge sensory hypersensitivity. A one-way ANOVA test was run for each variable to determine group differences, and several t-tests were run to determine differences between each group. From the subset, the gamma power, ITC at 40 Hz, and ERP onset ITC were statistically significant. The difference in gamma power was significant between the FXS and TDC group as well as the FXS and ASD group. The ERP onset ITC had significance between every group. The elevated gamma power and ITC at 40 Hz were found to be significant between FXS and TDC patients. There was found to be no significant difference in gamma power between ASD and TDC subjects. The limited sample size could account for these results. A possible avenue for reproduction and continuation of the larger study is using a different subset of participants. EEG similarities between ASD and FXS can aid clinically in determining which target measurements could be potential biomarkers.

Biology, Biochem & Ecology
10:55-11:10

ASSESSING NATIONAL WILDLIFE REFUGE PARTNERSHIP OPPORTUNITIES: CULTURALLY SIGNIFICANT PLANTS IN OKLAHOMA

Author(s): **Heath Steward**
University of Scholar: Oklahoma State University
Location of Research: 201 Stephenson Parkway Suite 2100, Norman, Oklahoma USA
Funding: Bureau of Indian Affairs Pathways Program, OK-LSAMP, South Central Climate Adaptation Science Center
Mentor(s): April Taylor- South Central Climate Adaptation Science Center

Assessing National Wildlife Refuge Partnership Opportunities: Culturally Significant Plants in Oklahoma is an assessment of the potential for a partnership network between National Wildlife Refuges and tribal entities which the South-Central Climate Adaptation Science Center informs on matters of climate change science. Indigenous peoples of North America have experienced a loss of cultural knowledge and practices due to colonialism and forced assimilation. Partnerships between National Wildlife Refuges and tribal entities are important because they can increase the ability to preserve and revitalize the relationship between indigenous people and the culturally significant plants which support their way of life. Three National Wildlife Refuges within Oklahoma were interviewed about their management of culturally significant plants and climate change management. Two out of the three refuges had active projects which have potential for tribal stakeholder participation. One of these programs involve rivercane and the other program involves both rivercane and a broad restoration project which can involve an array of cultural resource gathering. These programs would allow indigenous communities the opportunity to practice traditional knowledge and revitalize cultural traditions.

Biology, Biochem & Ecology
11:15-11:30

USING THE CRISPR CAS13 SYSTEM TO GENERATE A VIRAL DIAGNOSTIC TEST KIT

Author(s): **Caleb Watson**, Elijah Woodward, and Alisha Howard
University of Scholar: East Central University, Ada, OK, USA
Location of Research: East Central University, Ada, OK, USA
Funding: OK-LSAMP
Mentor(s): Dr. Alisha Howard, East Central University

This work entails the purification of Cas13 for use in a published CRISPR-Cas13 rapid viral diagnostic test strip with possible SARS-CoV-2 application. The pandemic of SARS-CoV-2 has left the world searching for a dependable rapid test. Point of care diagnosis would help slow the spread of the disease. Our lab is working on the plasmid expression and protein purification of Cas13 using various conditions. Purification of the affinity-tagged Cas13 protein as outlined in the protocol from the Zhang lab.[1] This published viral diagnostic kit previously been used to detect both Zika and Dengue viruses with single-nucleotide specificity from serum or urine samples of patients while in the field.[2] Analysis of expression parameter effects on yield and activity will be the endpoint goal moving the project forward. This development of a purification scheme for Cas13 will be incorporated in the lab projects overall collaborative next-step of use in SARS-CoV-2 rapid diagnostic test strips.

Kellner MJ, Koob JG, Gootenberg JS, Abudayyeh OO, Zhang F. SHERLOCK: nucleic acid detection with CRISPR nucleases [published correction appears in Nat Protoc. 2020 Mar;15(3):1311]. *Nat Protoc*. 2019;14(10):2986-3012. doi:10.1038/s41596-019-0210-2

Myhrvold C, Freije CA, Gootenberg JS, et al. Field-deployable viral diagnostics using CRISPR-Cas13. *Science*. 2018;360(6387):444-448. doi:10.1126/science.aas8836

Biology, Biochem & Ecology 11:35-11:50

Dysregulated Immunity Research Techniques

Authors: Marissa D. Wilson
University of Scholar: Langston University
Location of Research: Johnson Space Center, Houston, Texas, USA
Country Funding: Minority University Research and Education Program (MUREP) And Oklahoma Louis Stokes Alliances for Minority Participation (OK-LSAMP)
Mentors: NASA Mentor: Brian Crucian, Ph.D., Johnson Space Center

Immune dysregulation occurs due to exposure to microgravity. As a result, the goal is to learn techniques to measure and understand immune dysregulation. Peripheral Blood Mono-nuclear Cells (PBMCs) from tubes of acid citrate dextrose (ACD) containing blood and cell stimulation via mitogens, staphylococcal enterotoxins A and B (SEA and SEB), phytohaemagglutinin (PHA), Cluster of Differentiation 3 and 28 (CD3 and CD28), and phorbol myristate acetate (PMA), and a blank tube were the first two processes. The conditions were static and modeled microgravity. Cell activation analysis via Gallios Flow Cytometer showed that stimulated cells under microgravity had severely lower T cell activation rates. Whole blood analysis also had lower activation for the T cells. Intracellular staining involved PBMC isolation, stimulation, and staining. After PBMC isolation, all cells received Brefeldin A to plug the Golgi apparatus and Monensin to stop the Golgi apparatus. As a result, cytokines collected inside without the ability to transport those proteins. Phorbol Myristate Acetate Ionomycin (PMAI) and SEA with SEB stimulated the cells. CO_2 Incubation for five hours simulated the human body's condition. Afterward, the perm wash buffer enabled disruption of the cell's membrane. Anti-human Tumor Necrosis Factor-alpha (TNF-a), interferon-gamma-a, CD4 APC Cy7, CD3 APC, CD8 V450, and the perm wash buffer made up the surface stain and antibody cocktails added to each tube. SEA with SEB produced more cytokines than PMAI. These techniques come together to resolve immune dysregulation as the research becomes more specific and intricate.

Microbiology & Entomology 10:35-10:50

Stormie Dreadfulwater, Jeffrey A. Hadwiger, Nicholas Kiger
Department of Microbiology and Molecular Genetics, Oklahoma State University

Dictyostelium discoideum is a model organism that allows us to study cell movement and development in an organism similar to that in animal cells. As in animal cells, *Dictyostelium* has G protein-coupled receptors that are stimulated by chemoattractants and subsequent signaling leads to many cellular responses, which includes cell movement. Previous studies have demonstrated that chemotactic responses to cAMP are mediated through cell surface cAMP receptors and the Gα2 G protein. Removing Gα2 impairs cAMP chemotaxis but not other responses to cAMP such as activation of the Erk2 MAP kinase and the translocation of the GtaC transcription factor, suggesting another G protein might compensate for the loss of Gα2. The related G protein, Gα1, could potentially have functions similar to Gα2 but little is known about the role of the Gα1 subunit in chemotactic responses. The Gα1 gene was disrupted to create $g\alpha1^-$ cells and these were analyzed for the ability to chemotaxis to folate and cAMP. The $g\alpha1^-$ cells reacted to folate or cAMP with movement similar to wild-type control cells suggesting that Gα1 function is not required for this movement. However, preliminary results suggest that cells lacking both Gα1 and Gα2 subunits have impaired translocation of the GtaC transcription factor. These results suggest that Gα1 and Gα2 might have redundant functions in the regulation of this transcription factor.

Microbiology & Entomology
10:55-11:10

ABNORMAL ION CONCENTRATION IN CYSTIC FIBROSIS LUNGS IMPACT RHAMNOLIPID PRODUCTION IN PSEUDOMONAS AERUGINOSA

Author(s): **Casandra Salinas**, Michelle M. King, Marianna A. Patrauchan
University of Scholar: Oklahoma State University
Location of Research: Department of Microbiology and Molecular Genetics, Stillwater, OK
Funding: OK-LSAMP, McNair, NIH, NSF
Mentor(s): Dr. Marianna A. Patrauchan, Dr. Michelle M. King, Department of Microbiology and Molecular Genetics

Pseudomonas aeruginosa is a ubiquitous bacterium that can reside in a variety of environments such as soil, water, plants, and animals. It is also a human pathogen causing severe infections, and a leading cause of death in cystic fibrosis (CF) patients. CF patients have a dysfunctional chloride channel, which results in a disruption of ion homeostasis. With the disease progression, the lung capacity decreases limiting gas exchange. *P. aeruginosa* is able to adapt and survive in the host environment. Understanding the mechanisms of such adaptations will aid in discovering innovative treatments against infections. One of the factors enabling survival is its ability to move. Swarming motility (one of four types of motility used by pathogen), which relies on the production of biosurfactant rhamnolipid, is required for biofilm formation; another important determinant of *P. aeruginosa* physiological plasticity, including its ability to infect a host. Previously, we have demonstrated that the environmental conditions impact swarming behavior. We hypothesized that the chemical conditions in the CF lungs affect the regulation of rhamnolipid biosynthesis. We aimed to determine the impact of these conditions on the expression of *rhlA*, required for production of rhamnolipid. For this, we used a promoter construct (P*rhlA-gfp* fusion), containing *rhlA* promoter upstream of *gfp*. We have determined that the presence of elevated Ca^{2+} and Fe(II) increased *rhlA* promoter activity. Our data also indicate a loss of *rhlA* promoter activity when the cells carrying the construct are exposed to 5% CO_2. This abolishment of the *rhlA* promoter activity occurs even at elevated Ca^{2+} and Fe(II). *rhlA* expression is reduced by high NaCl concentrations. Both PO_4^{3-} and Mg^{2+} in the presence of Ca^{2+} increase *rhlA* promoter activity, but as Mg^{2+} concentrations increase, even in the presence of Ca^{2+}, *rhlA* expression decreases. These results show multifactorial nature of *P. aeruginosa* rhamnolipid regulation.

Microbiology & Entomology 11:15-11:30

HEME IRON ACQUISITION IN MYCOBACTERIUM TUBERCULOSIS

Authors: **November Sankey** and Avishek Mitra
Oklahoma State University, Stillwater, OK, USA
Location: LSE 318, Oklahoma State University
Funding: OK-LSAMP, National Science Foundation (NSF)
Mentor: Dr. Avishek Mitra, Oklahoma State University

Mycobacterium tuberculosis (Mtb) is the leading cause of death worldwide by a bacterial pathogen resulting in 1.4 million deaths annually. Mtb is transmitted through aerosols and enters the host alveolar passages. It proliferates in the alveolar macrophages by efficiently inhibiting macrophage maturation and formation of the phagolysosome. An essential aspect of Mtb survival and virulence is the acquisition of iron within the macrophage. Even though iron is abundant in the human host it is sequestered by transport proteins such as transferrin and lactoferrin or stored in ferritin. Mtb overcomes this iron deficiency through production of siderophores, which directly acquire iron from host transferrin for vital cellular processes. However, host transferrin, lactoferrin and ferritin make up only a small pool of the actual iron source in the host. Approximately 90-95% of host iron is sequestered in heme and hemoproteins making them the major source of iron. Using the toxic heme analog gallium-protoporphyrin IX, we discovered that some proteins of the mycobacterial PPE (**p**roline-**p**roline-**g**lutamate) protein family are involved in heme utilization. We have also found that some of these PPE proteins are channel forming outer membrane proteins. Since, Mtb has a very unique outer membrane compared to gram-negative bacteria, it is plausible that Mtb have evolved to employ unique outer membrane proteins for nutrient acquisition. Our overarching goals are to identify components required for heme utilization in Mtb and understand how these unique PPE proteins contribute to this process.

Microbiology & Entomology 11:15-11:30

RELATIONSHIPS IN RESERVOIRS: DRIVERS OF ZOOPLANKTON SIZE

Author(s): **Autumn Sutton** and Rachel Hartnett
University of Scholar: Oklahoma State University, Stillwater, OK, USA
Location of Research: Integrative Biology Department, Oklahoma State University
Funding: OK-LSAMP and the College of Arts and Sciences, Oklahoma State University
Mentor(s): Dr. Rachel Hartnett, Oklahoma State University

Different factors influence zooplankton biomass, including water clarity and seston biomass, but the degree to which they both affect specific size fractions of zooplankton biomass is not well characterized in reservoirs. Oklahoma has several reservoirs that experience a range in turbidity; turbidity could negatively affect predators that hunt visually. Seston includes producers and food for herbivorous zooplankton; a shortage or increase in the seston biomass should positively result in an increase in zooplankton biomass. When comparing seston and turbidity with zooplankton biomass, it is expected that lower turbidity should result in higher zooplankton biomass whilst higher amounts of seston biomass will also result in higher zooplankton biomass. We sampled eight small reservoirs in Oklahoma, and measured secchi depth, seston biomass (<53 μm), and zooplankton biomass separated into small (53-250 μm), medium (250-475 μm), and large (<475 μm) size fractions. We found slight positive relationships between seston biomass and both medium and large zooplankton. We did not find significant differences between zooplankton biomass and water clarity. By using secchi depth data and seston biomass data it can be seen that while they have an effect on zooplankton biomass, they are not the largest influences in the environment. To summarize, on the small-scale in Oklahoma reservoirs, neither seston biomass or secchi depth make a large impact on zooplankton biomass, and further research will need to be conducted to see other possible influences.

Physics, Math & Engineering
10:35-10:50

Role of Defects on Covalent Functionalization of Graphene and Carbon Nanotubes[1,2]

Kellan Brown, and Dr. Sanjiv Jha, Department of Physics, East Central University, Ada, OK.

We applied plane-wave density functional theory (DFT) computational method to study the effects of defects on the covalent functionalization of graphene and carbon nanotubes (CNTs) with benzyne molecule. Our DFT calculations were performed using the Quantum-ESPRESSO electronic structure code. Graphene sheets were modeled using 4x4, 5x5, and 6x6 graphene supercells with 32, 50, and 72 C atoms, respectively, whereas carbon nanotubes of Armchair (8,8) and Zigzag (13,0) edges were modeled with supercells containing 128 and 156 C atoms, respectively. Defected carbon nanomaterials were simulated by creating Stone-Wales (SW) and double vacancy (DV) defects within the surface and sidewalls of graphene and CNTs, respectively. Stone-Wales defects were created by 90° in-plane rotation of C-C bonds about their midpoint, whereas double vacancy defects were created by removing 2 C atoms from these nanostructured materials. Our calculations demonstrated that the presence of defects in graphene and CNTs enhances the binding of benzyne to the surface of graphene, and side walls of CNTs. The computed results also indicated that the binding energies between benzyne and defected nanomaterials were dependent to functionalization sites.

[1] Supported by LSAMP
[2]The computing for this project was performed at the OU Supercomputing Center for Education & Research (OSCER) at the University of Oklahoma (OU).

Physics, Math & Engineering
10:55-11:10

Mathematicians have long sought to understand the symmetric group, as it has applications in many mathematical fields, and mirrors symmetry in nature. Classically, representations of the symmetric group are represented using Standard Young tableaux. Work by Russell, Tymoczko, Rhoades, and others gives an alternate construction using web diagrams. We generalize this approach to the Hecke Algebra. We examine representations of the Hecke Algebra represented by web diagrams, as well as the resultant directed graph and transition matrix between the two bases. We find that the transition matrix between tableaux acted on by the symmetric group and web diagrams acted on by the Hecke Algebra is upper triangular with positive entries.

Physics, Math & Engineering
11:15-11:30

EDUCATION FOR ALL AND PRIVATE EDUCATION EXPENDITURES

Authors: Afrah Boateng, **Brandy Herrera**, Aditi Parekh, Paweł Rybacki, Emmerich Davies
University of Scholar: University of Oklahoma
Location of Research: Cambridge, MA
Funding: University of Oklahoma FYRE, Summer Research Opportunity at Harvard
Mentor: Emmerich Davies, Harvard Graduate School of Education

With increasing integration into the world economy, scholars have suggested that low- and middle-income countries would face fiscal constraints and be forced to cut expenditures in basic services such as health and education. As a result, individuals would be forced to pick-up the slack and the fiscal responsibility for paying for basic services would be shifted from states to individual households. However, it is unclear how much indviduals and countries are currently spending on services. In this cross-country study, we seek to understand how much individuals spend on education across space and time. We will use these findings to analyze education spending within the context of individual countries and their policies. We hypothesize that when governments spend more on education, private spending falls and vice versa. Using multiple waves of the World Bank's Living Standards Measurement Study (LSMS), we are creating cross country-comparable dataset which will be used to understand if and where burden shifting has occurred from states to individuals.

Physics, Math & Engineering
11:35-11:50

SYNTHESIS OF HYDROPHOBIC CARBON LAYERS WITHIN A BIODIESEL, DIFFUSION, OXYGEN ENRICHED-AIR FLAME

Authors: **Duncan Merchan-Breuer** and Wilson Merchan-Merchan
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Location of Research: Combustion, Plasma, and Nanoparticle Laboratory, Norman, OK, USA
Funding: The Oklahoma Louis Stokes Alliance for Minority Participation (OK-LSAMP) and the National Science Foundation REU CBET-1440030
Mentor: Dr. Wilson Merchan-Merchan, University of Oklahoma

We report the rapid single-step flame synthesis of hydrophobic carbon layers (C-layers) on the surface of stainless-steel (SS) substrates using vaporized biodiesel as the fuel. A co-flow canola methyl ester (CME) diffusion flame is used to generate a hydrophobic monolayer on the surface of the metal substrate upon its insertion into the reaction zone. Carbon deposition on the surface of the SS substrates varies by altering the oxygen content of the oxidizer stream and the substrate's insertion height into the flame. The thickness, mass, and hydrophobic properties of the flame formed monolayer were found to vary depending on the oxidizer and the substrate's insertion point into the flame. We hypothesize that a small inner cone of the biodiesel flame, along with a high soot propensity, can result in an ideal medium to form uniform hydrophobic C-layers of unique hierarchical surface structure. This is supported by C-layer mass/thickness values and flame temperature data collected. As oxygen percentages and flame temperatures increased, the size of the flame region to form hydrophobic C-layers decreased. Hydrophobic properties of the C-layers were quantified by measuring the contact angle of water droplets placed on the layer's surface. It seems that C-layers formed at higher oxygen content becomes unstable and tend to easily detach as large fragments of curled/peeling layers at the edge of the deposits. We believe the instability of these layers is caused by the large thermal stresses experienced by C-layers formed in oxygen enriched-air flames; these stresses are evident in images obtained via scanning electron microscope. Increased oxygen content led to surfaces with large cracks that grew as oxygen content was increased. Further research is needed to fully understand the effect of oxygen on the formation of hydrophobic C-layers.

POSTER PRESENTATIONS

Listed Alphabetically

Life Sciences

First Name	Last Name	University	Discipline
Brittney	Conn	OSU	Microbiology
Cheyenne	Daugherty	OSU	Microbiology
Brenden	Determann II	OSU	Microbiology & Molecular Genetics
Alissa	Eberhard	NSU	Cell and Molecular Biology
Sierra	Posey	OSU	Microbiology & Molecular Genetics

Non-Life Sciences

First Name	Last Name	University	Discipline
Elisabeth	Allbritton	SWOSU	Chemistry
Trey	Biddy	SWOSU	Engineering
Brenden	Dominick	OSU	Mechanical Engineering
Leslie	Garcia	SWOSU	Chemistry
Ashtyn	McAdoo	SWOSU	Chemistry
Abner	Nimsey	SWOSU	Chemistry
Shawn	Ray	OSU	Electrical Engineering
Makya	Stell	OU	Computer Engineering
Ryleigh	Tucker	UCO	Statistics
Tayler	Valdez	SWOSU	Engineering Physics
Joseph	Wagner	UCO	Mechanical Engineering

Additional Submitted Abstracts

First Name	Last Name	University	Discipline
Esmeralda	Alcala	OU	Microbiology
Aaron	Austin	OSU	Physics
Julia	Ceniceros	OU	Biochemistry
Alexis	Coles	OSU	Entomology
Taylor	Coles	OSU	Entomology
Rylee	Dunlap	SE	Biomedical Sciences
SheKayla	Love	CU	Physics
Sergio	Mares	OSU	Microbiology & Molecular Genetics

POSTER PRESENTATION ABSTRACTS

Alcala

THE ROLE OF WRKY TRANSCRIPTION FACTORS IN VIRUS HOST INTERACTIONS DURING DROUGHT

By Esmeralda Alcala
Susan Schroeder, Jose Macias, Will Runion, Daniel Pfaff

The change in climate across the world has been a concern for the agricultural industry especially when it comes to drought. The common response so far has been to genetically modify the plants (GMOs) but there are many concerns with this practice. An alternative method is to stimulate the plant's immune system by infecting it with a specific to plant virus which will handle drought stress better than an uninfected plant. To test this method, we analyze the gene expression of plants dealing with drought conditions through a group of transcription factors unique to plants called WRKY (named after the main amino acids in the sequence). In this study, the WRKY genes of interest are from the tomato plant, *Solanum lycopersicum*. The WRKY genes of interest are from the *Solanum lycopersicum* tomato plant, which we infected with Tobacco Mosaic Virus (TMV) or Satellite Tobacco Mosaic Virus (STMV). Tracking the common WRKYs expressed after a plant is infected helps us understand the specific WRKYs activated for each virus. We hypothesize that the commonly expressed WRKY factors in different virus infections might also be responsible for drought tolerance.

Allbritton

Ethylene cross-bridged tetraazamacrocycles have been known for multiple decades and have two primary attributes in their transition metal complexes that have made them increasingly popular for as ligands to stabilized transition metal ions for applications as diverse as oxidation catalysis and inorganic drug molecules: 1. their topological constraint and rigidity makes their transition metal complexes extremely stable even under harsh conditions, and 2. their folded structures place free coordination sites on their metal ions cis to one another as required for specific catalytic and biological binding events. Our work has recently produced pentaaazamacrocyclic analogues of these ligands which we have named cross-bridged pentaazamacrocycles. This presentation will outline the structural and kinetic stability data we have gathered on this new family of topologically constrained macrocyclic ligands. In particular, the crystal structure of a Cu(II) complex will be correlated with its ability to survive under harsh acidic aqueous conditions.

Austin

The pioneers in the field of carbon not only have recognized its flexibility in binding with other elements, forming in different shapes and resulting in a variety of novel compounds but also that controlling its structure and morphology are the keys to unlocking its properties or tailoring it for specific technological applications. The road to discovery of new forms of carbon is through the development of new techniques for simultaneously manipulating its bonding and the morphology of the structures produced. Will new materials created have novel properties that facilitate new technologies or significantly improve existing technologies? A new type of mesoscopic tubular carbon, which is referred to as Boron Ortho-carborane Doped (BOD) Carbon, has been produced by boron doping of the pseudo-graphite known as GUITAR (Graphite University of Idaho Tar). Transmission electron microscopy of the individual tubular BOD-carbon structures disclose a disordered nano-graphitic composition. Atomic Force Microscope images of the backside of films of GUITAR and BOD -carbon reveal that GUITAR consists of overlapping downward curving (toward the Si substrate) structures, while BOD-carbon consists of upward-curving (away from the Si substrate) structures, which in turn, facilitates the formation of the tubular morphology. This change in curvature from downward to upward with the incorporation of B is attributed to B substitution of C and/or interstitial B, concomitant with the introduction of strain that modifies the interfacial energy at the carbon-Si interface, such that the curvature of BOD-carbon is away from the substrate. This work demonstrates that previously unobserved forms of graphitic carbon can be obtained by manipulating strain in graphitic carbon at the atomic scale, and due to their unique morphology they are suitable for use in applications that are beyond the capabilities of the already known carbon nanotubes.

Biddy

THE HUMAN POWERED ROVER

Author(s): **Trey Biddy**
University of Scholar: Southwestern Oklahoma State University
Weatherford, OK, United States of America
Funding: OK-LSAMP
Mentor(s): Cindi Albrightson, Southwestern Oklahoma State University

Every year NASA puts on a competition where students from all across the world compete in designing and building a human powered rover. After these rovers have been complete the students then compete their rover on a course meant to represent terrains that could be faced in upcoming space missions. Over the last two years I have been researching the best way to design and develop a human powered buggy that can traverse Martian and Lunar terrain. The future of space travel is highly important as well as being able to travel the surface of our new home. In doing this, a lightweight yet highly durable buggy is needed. The buggy must also be human powered in the case of a failure with the engine it must be able to get the operators back home safely. While building this rover I have faced many challenges mainly dealing with different types of materials, weight problems, and many more. My research focused on the types of material to make a lightweight, yet durable wheel that could traverse these very difficult types of terrain. The future of space travel will depend on having a means of travel that would be designed in a way of safety, durability, and lightweight.

Ceniceros

Targeting NF-kB Signaling using a Novel Inhibitor in DLBCL

Diffuse Large B-Cell Lymphoma (DLBCL) is the most common type of non -Hodgkins lymphoma, and it affects mostly patients over the age of 60. DLBCL is an aggressive B-cell malignancy that can be categorized into two predominant subtypes based on the cell of origin, recurring mutations, and molecular features of the cell. One of the prominent subtypes is Germinal Center B-cells, also known as GC-DLBCLs. The other subtype is Activated B-cells (ABC-DLBCL). This subtype tends to be more aggressive and does not respond to R-CHOP therapy as well as the GC-DLBCLs. In this research project, the El-Gamal laboratory used a novel inhibitor in order to inhibit the NF-kB pathway. This pathway plays a crucial role in cancer because it promotes malignant cell proliferation. An MTS assay was used in order to determine the effects of the novel inhibitor on 3 different types of cell lines, two ABC-DLBCLs, and one GC-DLBCL. The ABC-DLBCL cell lines were OCI-LY3 and RI-1 while the GC-DLBCL cell line was Pfeiffer. The IC50 of all of the cell lines was analyzed to determine the effects of the novel inhibitor. The NF-kB inhibitor showed cytotoxic effects across all DLBCL types but especially in the ABC-DLBCLs, which are dependent on the NF-kB pathway.

A. Coles

Electropenetrography comparison of male vs female planthopper probing activity

Alexis Coles, Ordom Huot, Anna Whitfield, and Astri Wayadande

Female *Perigrinus maidis* planthoppers are twice as large as male planthoppers. We hypothesize that females feed more on maize than do male planthoppers. The probing behavior of male vs female planthoppers was studied using Electropenetrography (EPG. Sixteen to 20 adults of each gender were electronically recorded for six hours while feeding on 5-6 leaf maize plants. After EPG recording, the waveforms were measured and analyzed. This species produced at least eight distinct waveforms, including those that represent xylem and phloem ingestion. The male planthoppers made the same waveform patterns as the females. Specific EPG parameters such as mean probe number, mean probe duration, time to first probe, mean duration of xylem ingestion, and mean duration of phloem ingestion will be discussed. The conclusion for this study was the male planthoppers had a similar feeding strategy as that of the female planthoppers.

T. Coles

Title: Diversity of Insects in the Central Plains.

Insect diversity has been a hot topic of discussion as some recent studies suggest that insect populations and diversity are shrinking worldwide. The purpose of this research was to look at populations of insects over time within the Central US and obtain estimates of diversity. Since many insects are most abundant during the late summer and early fall, September to the end of October was the main time focus for collecting samples in order to identify population diversity of insects. To collect the data, an aerial net was used to sweep in three separate locations near Stillwater, OK. One location was mixed grasses next to a major highway, a second location was a plot of land containing mixed grasses in a rural area, and the last one was the Botanic Garden at Oklahoma State University. Thirty sweep samples were collected weekly and frozen until the insects could be identified. The results showed Site three had the highest diversity index according to site comparison and then September 18, 2019, had the highest diversity according to date comparison. This was made possible using a comparison of Shannon's diversity index.

Conn

ANTIFUNGAL ACTIVITY OF EIPE-1, AN EUMELANIN-INSPIRED COMPOUND AGAINST *CRYPTOCOCCUS NEOFORMANS* AND *CANDIDA ALBICANS*

Author(s): **Brittney Conn**, Emma Martiz, Toby L. Nelson, and Karen L. Wozniak
University of Scholar: Oklahoma State University, Stillwater, OK, USA
Location of Research: Oklahoma State University, Stillwater, OK, USA
Funding: Wentz Lew Foundation and Cowboy Technologies
Mentor: Dr. Karen L. Wozniak, Oklahoma State University

In the past century, anti-fungal drugs have had much success in the treatment of fungal pathogens. However, due to similarities between fungal and mammalian cells, many of these treatments are toxic. In addition, fungi have developed resistance against existing antifungal drugs. Currently, there are only four separate classes of antifungal agents that target plasma membrane sterols (ergosterol), nucleic acid synthesis and cell wall constituents, and some of these existing drugs are not effective against all fungal pathogens. To combat this issue along with antibiotic resistance in bacteria, a eumelanin-inspired indoylenepheyleneethynylene, EIPE-1, derived from vanillin was synthesized. The synthetic compound has demonstrated antimicrobial effects on the methicillin resistant *S. aureus* (MSRA), but not on the gram-negative organisms. We hypothesized that EIPE-1 could also be used to kill fungal pathogens. For these studies, we tested EIPE-1 against the fungal pathogens *Cryptococcus neoformans* and *Candida albicans*, which are responsible for over 200,000 yearly deaths. Our results showed that EIPE-1 has considerable anti -fungal effects on *C. neoformans* with a MIC of 1.749 ug/ml and a MIC of 2.705 ug/ml for *C. albicans*. In addition, we conducted scanning electron microscopy (SEM) and transmission EM (TEM) on the exposed cells at varying time points. Cells exposed for four or more hours displayed structural changes to their cell wall. Overall, we conclude that EIPE-1 does display potent anti-fungal activity against *C. neoformans* and *C. albicans*. Future studies will examine the mechanism of the activity of EIPE-1 against these fungal pathogens.

Daugherty

INTERACTIONS OF *CRYPTOCOCCUS NEOFORMANS* WITH HUMAN AIRWAY PHAGOCYTES

Author(s): **Cheyenne Daugherty**, Benjamin Nelson, and Karen L. Wozniak
University of Scholar: Oklahoma State University, Stillwater, OK, USA
Location of Research: Oklahoma State University, Stillwater, OK, USA
Funding: OSU Startup; NIGMS-NIH P20GM103648: Oklahoma Center for Respiratory and Infectious Diseases (OCRID) Pilot grant; NIH 1 P20 GM134973-01
Mentors: Dr. Karen Wozniak, Oklahoma State University

Cryptococcus neoformans is an opportunistic fungal pathogen that is inhaled from the environment and causes over 225,000 yearly cases of cryptococcal meningitis in immune compromised patients, leading to 180,000 annual deaths in HIV/AIDS patients. Innate airway phagocytes, such as macrophages and dendritic cells (DCs), are the first cells to interact with the pathogen in the lungs. We hypothesized that specific subsets of innate airway phagocytes kill *C. neoformans*, while other subsets allow the pathogen to survive and grow intracellularly. We first examined the association between innate phagocytes and *Cryptococcus* using flow cytometry. Cells were also examined by fluorescence microscopy to examine the cryptococcal morphology within the cell. Results of flow cytometry studies showed *C. neoformans* interacts with all subsets of airway phagocytes. Microscopy showed that alveolar macrophages contained c -shaped organisms (indicating cell death) and langerin^{+} DCs contained replicating *C. neoformans*. These results indicate that *C. neoformans* does rely on certain specific airway phagocytes for intracellular survival, while other subsets can kill the organism. In order to verify that c-shaped organisms are dead, we conducted experiments with *C. neoformans* and the live/dead dye Fun-1. Fun-1 is used to determine metabolic activity of fungal organisms. We examined Fun-1 staining in live and heat-killed *C. neoformans* by flow cytometry. Results showed that we are able to distinguish between live and dead cells. Future studies will examine Fun-1 staining of *C. neoformans* following interaction with human airway phagocytes to verify killing or replication within each subset.

Determann

Pulmonary Dendritic Cell Subset Interactions with *Cryptococcus neoformans*

Brenden Determann, Ashlee Hawkins, Benjamin Nelson, and Karen L. Wozniak

Cryptococcus neoformans is an opportunistic fungal pathogen acquired by inhalation that causes cryptococcal meningitis. This disease results in over 180,000 annual deaths in patients with AIDS. Innate phagocytes in the lung can kill *C. neoformans,* or it can evade killing and replicate intracellularly. Intracellular survival is thought to be responsible for dissemination of *C. neoformans* from the lung to the brain, causing meningitis. Dendritic cells (DCs) are innate phagocytes that can kill *C. neoformans* in vitro, and these cells are recruited to the lungs during cryptococcal infection. Two subsets of conventional DCs are described in the murine lung: $CD11b^{+}$ and $CD103^{+}$. Based on our data with other innate phagocytes, we hypothesized that pulmonary DC subsets have different interactions with *C. neoformans*. We first purified DC subsets from murine lungs and analyzed DC-cryptococcal interaction. Flow cytometry confirmed interaction of each DC subset with *C. neoformans.* Antifungal assays showed that neither DC subset has significant antifungal activity in vitro. Cytokines/chemokines most abundantly produced by the $CD11b^{+}$ subset included KC, MIP-a, RANTES , and TNF-a (2 and 24h post-incubation), while those most abundantly produced by the $CD103^{+}$ subset from female mice included MCP-1 and IL-6. Imaging flow cytometry showed condensed cryptococcal material inside of both DC subsets, indicating some degree of antifungal activity. Further RNA sequencing studies will be used to identify genes that are up- or down-regulated in DC subsets following cryptococcal interaction. Understanding mechanisms of DC antifungal activity or fungal immune evasion will provide new therapeutic targets for cryptococcal meningitis.

Dominick

USING MACHINE LEARNING TO CREATE PREDICTIVE MODELS FOR STORM DAMAGE IN THE UNITED STATES

Author(s): Brenden Dominick
University of Scholar: Oklahoma State University, Stillwater, OK, USA
Location of Research: Oklahoma State University, Stillwater, OK, USA
Funding: Jointly funded by the NSF CAREER grant ECCS-1944500 and OKLSAMP
Mentor(s): Dr. Farzad Yousefian, Oklahoma State University

The research objective of this project is to apply machine learning techniques to create a predictive model where given a particular month and a state, the model predicts the expected storm damage in dollars for that specified month and state in the USA. This knowledge could be of significant importance for emergency planners and future disaster relief funding in areas of high risk. We use the publicly available data collected from the National Center for Environmental Information including 300,000 data entries for weather events in the past five years. This data holds detailed information regarding the time, type, location, severity of storm events, damage, injuries, deaths, and the estimated damage caused by storms. It includes events such as hurricanes, ice storms, hail storms, and tornados. We consider both linear regression and neural network deep learning models. After preparing the data and running implementations for training and testing the models, the Neural Network (NN) model was found to perform very well on the test data. The developed NN model can be used to make predictions about the expected loss in dollars associated with future storms and also assess the risk of having a severe storm. In this project, we used Python 3.0 as the coding language, Jupyter Notebook as the user interface, and the scikit-learn as the main machine learning library.

Dunlap

Comparative Study of COVID-19 and Seasonal Influenza

Rylee Dunlap, Ning Wu
Department of Biological Sciences, Southeastern Oklahoma State University, Durant, Oklahoma 74701.

Due to recent events, coronavirus (COVID-19) has become one of the most known viruses along with influenza (flu). The prevalence of both viruses has been a major topic of interest in the science community, and this study aims its focus at comparing the cumulative cases, deaths, and hospitalizations of both COVID-19 and influenza. Numbers were retrieved from the CDC, Worldometer, and the COVID Tracking Project databases from October 2019 to the end of April 2020. The results showed that, among the cumulative cases, hospitalizations, and deaths, COVID-19 demonstrated much higher rates than that of seasonal influenza in the same length of time, which indicated that COVID-19 has much stronger infectious capability, severity, and mortality than that of seasonal influenza, especially in the first three months of spread across the U.S.A. The number of cumulative cases in COVID-19 is 4.89 times more than seasonal influenza. The number of hospitalizations that is also a reflection of disease severity of COVID-19 is 1.72 times higher than that of seasonal influenza. The number of deaths for COVID-19 is 1.55 times higher than that of seasonal influenza. Currently, COVID-19 is still ongoing. Based on our continuous collected data extended from this study, the toxicity and severity of COVID-19 demonstrated the weak trend comparing to that in this study, even though the infectious capability is still very high. Additional following up studies of COVID-19 development in U.S.A. will be continued to understand the epidemiological features of this virus.

Eberhard

Studying Host-Pathogen Interactions with Glowing Bacteria

Alissa Eberhard and Janaki K. Iyer
Department of Natural Sciences, Northeastern State University, Broken Arrow, Oklahoma.

Escherichia coli (*E. coli*) is a Gram-negative, motile opportunistic pathogen that is abundantly found in our gastrointestinal tract. While many strains of *E. coli* are beneficial, some strains of *E. coli* are pathogenic and can cause gastrointestinal as well as urinary tract infections (UTIs). In fact, *E. coli* are the causative agent for over 75% of UTIs. Uropathogenic *E. coli* are difficult to treat due to virulence factors expressed by some strains of this bacterium, such as adhesins and fimbriae, which allow the pathogenic bacteria to adhere and invade the host cells. To increase our understanding of pathogenic mechanisms employed by *E. coli,* we propose to study the cellular trafficking and colonization patterns of non-pathogenic and pathogenic strains of *E. coli*. To this effect, our aim was to generate non-pathogenic and pathogenic strains of *E. coli* that express the green fluorescent protein (GFP). The non-pathogenic *E. coli* K12 strain and pathogenic *E. coli* CI5 strain were rendered chemically competent and transformed with a plasmid expressing GFP by the heat shock method. To determine if transformation was successful, plasmid isolation followed by digestion with restriction enzymes was performed. Additionally, fluorescent microscopy was employed to confirm and visualize the presence of GFP expression by both bacterial strains. These fluorescent strains of bacteria will be used in experimental assays to characterize and compare adhesion and invasion mechanisms in the different strains of *E. coli.* The results of these studies will lead to better understanding of pathogenic mechanisms that will aid in designing effective therapeutic strategies to treat UTIs caused by pathogenic *E. coli*.

Garcia

STERICALLY HINDERED CROSS-BRIDGED TETRAAZAMACROCYCLES

Author(s): Megan L. Whorton, **Leslie Garcia**, Su Lim, Timothy J. Hubin
University of Scholar: Southwestern Oklahoma State University, Weatherford, OK, USA
Location of Research: Southwestern Oklahoma State University, Weatherford, OK, USA Funding: the American Chemical Society Petroleum Research Fund and the National Science Foundation, through the OK-LSAMP program
Mentor(s): Dr. Timothy J. Hubin, Southwestern Oklahoma State University

Ethylene cross-bridged tetraazamacrocycles have found particular success in complexes used in catalytic oxidation of organic substrates. Several ligand derivatives have the two unbridged nitrogen atoms alkylated with different substituents, including methyl, benzyl, and ethyl groups. However, more extremely sterically bulky groups have not yet been utilized. The purposes of the proposed sterically bulky substituents are three-fold: (1) To prevent dimerization, allowing the study of monomeric complexes. Previous Mn and Fe work indicates that lack of steric bulk on the non-bridged nitrogens may allow dimers to form, which will alter the chemistry. Both dimers and monomers should be studied, thus the need for steric bulk. (2) In similar systems, bulky tBu groups lengthen and weaken M-N bonds and cause macrocycle twisting to keep the tBu groups far apart. Modification of the electronic properties of the complexes caused by these sterically induced complex deformations may help realize the specific properties needed for catalysis. (3) To encourage dissociation of one or more macrocyclic nitrogen due to steric bulk. These structural changes may lead to electronic and reactivity changes which should be explored. In this project, we have successfully synthesized an isopropyl substituted ethylene cross- bridged cyclen and its transition metal complexes. Synthetic details of the ligand synthesis and selected properties of the resulting metal complexes will be presented.

Love

Variability Study of RR Lyrae Star TV Lyn

Author(s): **She'Kayla Love**, Susmita Hazra, Michael Fitzgerald
University of Scholar: Cameron University, Lawton, OK, USA
Location of Research: Cameron University, Lawton, OK, USA
Funding: OK-LSAMP
Mentor(s): Dr. Susmita Hazra, Cameron University

In this research, we are presenting the light curve of RR Lyrae type variable star. The name of our star is TV Lyn. This star is observed in the northern hemisphere and its coordinates are 113.38262, 47.80280. RR Lyrae type stars are the brightest representative of the variable stars. They are typically low mass and found within an instability strip with a temperature ranging from 6000 K to 7250 K. These stars are only located in solar systems that contain a stellar component older than 10 Giga-years. Therefore, study of these stars can provide us information on the distance and properties of a specific solar system. We are using the data from Las Cumbres Observatory (LCO) which consists of a worldwide network of robotic telescopes. Photometric measurements were conducted using the 0.4-meter SBIG telescope. We have used advanced photometric techniques developed by Dr. Michael Fitzgerald & his team as a part of solar sibling project. Depending on the color of a star luminosity changes in different color filters. Our data consists of four filters, B (Blue), V (visual), I (Infrared), and Z (PAN-STARRS). Results show that this star has a variability period of 0.2409±0.003 days. Further analysis of our data can provide us information on intrinsic and extrinsic variables of this star.

Mares

***carP*, ENCODING A CA^{2+}–REGULATED B-PROPELLER PROTEIN, IS EVOLUTIONARY CONSERVED IN *PSEUDOMONAS AERUGINOSA* AND HAS POTENTIAL AS A BIOMARKER.**

Author(s): **Sergio Mares**, Michelle M. King, Aya Kubo, Anna Khanov, Erika I. Lutter, Noha Youssef, and Marianna A. Patrauchan
University: Oklahoma State University, Stillwater, OK, USA
Location of Research: Stillwater, OK, USA
Funding: the National Science Foundation (NSF)
Mentors: Dr. Marianna A. Patrauchan, Oklahoma State University

Pseudomonas aeruginosa infects patients with Cystic Fibrosis, burns, wounds, and implants. Previously, our group has shown that elevated Ca^{2+} positively regulates the production of several virulence factors in *P. aeruginosa*, such as biofilm formation, production of pyocyanin, and secreted proteases. We have identified a Ca^{2+}–regulated β-propeller protein, CarP, which is required for Ca^{2+} tolerance, regulation of the intracellular Ca^{2+} levels, and plays a role in Ca^{2+} regulation of *P. aeruginosa* virulence. Here, we studied the conservation of *carP* sequence and its occurrence in diverse phylogenetic groups of bacteria. *In-silico* analysis revealed that *carP* is primarily present in *P. aeruginosa* and belongs to the core genome of the species. We identified 155 single nucleotide alterations within *carP*, 42 of which lead to missense mutations with only three that affected the predicted 3D structure of the protein. PCR analyses with *carP* specific primers detected *P. aeruginosa* specifically in 70 clinical and environmental samples. Sequence comparison demonstrated that *carP* is overall highly conserved in *P. aeruginosa* isolated from diverse environments. Such evolutionary preservation of *carP* illustrates its importance for *P. aeruginosa* adaptations to diverse environments and demonstrates its potential as biomarker.

McAdoo

Cross-bridged tetraazamacrocycles form extremely stable transition metal complexes due to their topological constraint and rigidity. The stable complexes can be used in applications where complex stability is desirable, such as oxidation catalysis or biomedical applications. We have previously described a number of mono-pendant armed cross-bridged tetraazamacrocycles where the pendant arm can function to change the electronic properties of the metal complex with respect to the parent ligand, or provide a site for linking of the ligand to other moieties. Such pendant arms have included carboxylate, amine, pyridine, and phenolic donors. This work details our progress in the synthesis of cross-bridged tetraazamacrocycles having a single primary amine pendant arm. Several related routes involving Phthalimide protection/deprotection have been attempted with mixed results. A route involving the reduction of a primary amide has proven to be more reliable. Multiple transition metal complexes of the resulting ligands have been synthesized.

Nimsey

TOWARDS CONTROLLING THE ALKYLATION OF CROSS-BRIDGED PENTAAZAMACROCYCLES

Authors: **Abner J. Nimsey**, Alina Shrestha, Jeanette Krause, Allen Oliver, Timothy J. Hubin
University of Scholar: Southwestern Oklahoma State University, Weatherford, OK, USA
Location of Research: Southwestern Oklahoma State University, Weatherford, OK, USA
Funding: OK-LSAMP and the American Chemical Society Petroleum Research Fund
Mentor: Dr. Timothy Hubin, Southwestern Oklahoma State University

We have recently introduced a new class of topologically constrained ligand called cross-bridged pentaazamacrocycles. We have produced these ligands by two different synthetic paths. One involves regioselectivity of alkylation controlled by condensation of the parent unbridged pentaazamacrocycles with glyoxal to form aminal functional groups that limit alkylation and direct it to preferred nitrogen atoms which are all tertiary amines. The other follows a patent procedure involving tosyl protection, ring skeleton formation via classic Richman-Atkins strategies, and deprotection to form secondary amines. The latter approach allows addition of a range of alkyl groups and/or pendant arms to the cross-bridged pentaazamacrocyclic skeleton. In this presentation, we will describe the two synthetic pathways and their advantages and disadvantages. We will also present our recent attempts at pendant arm addition to this new topologically constrained parent system.

Posey

ANTI FUNGAL ACTIVITY OF LYSOSOMAL PROTEINS AND THEIR EFFECTS ON *CRYPTOCOCCUS NEOFORMANS*

Authors: **Sierra Posey**, Benjamin Nelson, and Karen L. Wozniak
University: Oklahoma State University Stillwater, OK, USA
Location of Research: Department of Microbiology and Molecular Genetics
Funding: OK-LSAMP, OSU Startup
Mentor: Dr. Karen L. Wozniak, Oklahoma State University

Cryptococcus neoformans is an opportunistic fungal infection spread through airborne means. It affects immune compromised individuals and increases their susceptibility to the disease. Previous studies showed that dendritic cells (DCs) can kill *Cryptococcus* through phagocytosis and lysosomal killing from within the DC. The lysosomal extract from these DCs has anti-cryptococcal activity, and we now have mass spectrometry data identifying its contents. We hypothesized that DC lysosomal proteins nostrin, calmodulin, and coronin 1a have anti-fungal activity against *C. neoformans*. For these studies, we incubated lysosomal extract or these individual proteins with *C. neoformans* to measure anti-fungal activity. Our results showed nostrin and coronin-1A had significant antifungal activity, while calmodulin significantly increased cryptococcal growth. Cytotoxicity was tested in nostrin and it was not toxic to mammalian cells. Because calmodulin increased cryptococcal growth, we hypothesized that following incubation with *C. neoformans*, the media contained growth-enhancing nutrients. For this, we examined the media for macronutrients, amino acids, and metals following incubation of *C. neoformans* with calmodulin and other growth-enhancing compounds S100A6, cystatin B, calnexin, striatin, and CRISP-1. We found that incubation of *C. neoformans* with calmodulin, cystatin B, and CRISP-1 led to increased biotin in the media, and trace elements including Cd, Fe, Mn were also increased following incubation of *C. neoformans* with calmodulin. Interestingly, some compounds alone increased trace metals, but incubation with *C. neoformans* brought those levels back to baseline amounts. Future studies will compare these components in the media to those from incubations with anti-cryptococcal molecules.

Ray

Electrical Responses of Conductive Nylon for Application in Low Cost Exoskeletons for Stroke Rehabilitation

Authors: **Shawn Ray** and Dr. Jerome Hausselle
University of Scholar: Oklahoma State University, Stillwater, OK, USA
Location of Research: Oklahoma State University, Stillwater, OK, USA
Funding: OK-LSAMP, McNair, Biomechanical Analysis and Musculoskeletal Modeling Lab
Mentor: Dr. Jerome Hausselle

Despite the rising popularity of robotic exoskeletons, high cost and bulkiness are two limitations that hinder their popularity and everyday use. Our overarching goal is to develop an electrically powered low-cost lightweight exoskeleton for stroke rehabilitation by expanding upon previous research showing that nylon can be utilized as an artificial muscle. Nylon fishing line and silver coated nylon were used as materials for coil production. Lines were twisted together into coils, keeping consistent contact throughout testing. Voltages were generated, while keeping tension on a coil, using a single channel function generator with frequencies of 1Hz and 2Hz, and voltages ranging from 500mV to 3V in increments of 500mV. Unexpectedly, when voltage was applied to coils no response was seen, except for an observed contracting force at one volt in each frequency. Conductive artificial muscle coils displayed contracting forces with at least one voltage level. Given that coils only responded to one volt and coil resistance did not vary significantly, we infer that the response was produced from a combination of the coils voltage and current level. Current work is focusing on developing more coils that can be tested for a wider range of voltage/ current levels. Future work will focus on testing additional conductive nylon varying in resistance. This study represents an important step towards designing artificial muscles that are electrically controlled. These muscles have shown the potential to be electrically powered and controlled, giving promise to electrically powered soft exoskeletons in future work which could replace bulky motor and actuator driven robotics altogether.

Stell

ANALYSIS OF VISUAL PRIVACY LEAKS ON TWITTER

Author(s): **Makya Stell**, Jasmine DeHart, Dr. Christian Grant
University of Scholar: University of Oklahoma, Norman, OK, USA
Location of Research: University of Oklahoma, Norman, OK, USA
Funding: OK-LSAMP, Gallogly College of Engineering, OUDAL
Mentor(s): Jasmine DeHart & Dr. Christan Grant, University of Oklahoma

People are frequently updating their Twitter feeds with images and 'tweets' that can reveal personal information about themselves. Today, people will take a picture without considering the private information that can be revealed with these images. Due to the accessibility of mobile devices and the internet, the posting and sharing of content on social media networks (SMNs) has increased exponentially. As stated in our previous papers, privacy leaks include any instance in which a transfer of personal identifying visual content is shared on SMNs (DeHart and Grant, 2018). We also noted that private visual content (images and videos) exposes intimate information that can be detrimental to your finances, personal life, and reputation (DeHart and Grant, 2018). Private visual content can include license plates, driver's licenses, college acceptance letters, house keys, etc. We have also found that we will have to follow users' posting trends because people have found creative ways to post sensitive information on Twitter unknowingly. Hashtags and new phrases make it difficult to pinpoint all of the sensitive information that is posted on Twitter.
For example, when you search #driverslicense, you will find some images of driver's licenses, but most of them are sample licenses and stock images. But, when you search the phrase "licensed to drive" and/or #stayoffthesidewalk, you will find multiple images of license plates, car keys, paperwork, and driver's licenses. All of these items can not only give away a person's home address, but they can also be used to also find out more information about a person, such as their phone number, identifiable features, etc. We need to gain the ability to successfully locate and return these images so that they can be monitored and filtered out. These filters will allow all Twitter users to have a positive social media footprint.

Tucker

A Statistical Analysis of a Child Abuse Prevention Education Program

In Oklahoma County, roughly one-third of girls and one-fifth of boys will be a victim of child abuse before they turn 18. Sadly, only one-tenth of these abused children will tell an adult about the abuse. The CARE Center is a child advocacy center in Oklahoma City that works to end child abuse. The CARE Center teaches children aged 4-8 how to ROAR, an acronym children can use to remind themselves about personal body safety, tell people about their abuse, and always have adults they can feel safe around. Children in classroom settings are asked a series of five questions before being taught the ROAR lesson. After the lesson, they are asked the same series of questions to determine what the children learned from the lesson. To date, the CARE Center has conducted this program in more than 150 classrooms (or YMCA groups) across Oklahoma County. In each case, the numbers of children responding positively to the pre- and post- questions were recorded for each question, along with the total number of students in each class, and the grade level of each class. Additionally, demographic data concerning race, poverty, education level, parental support, etc. were collected from Oklahoma's Office of Educational Quality and Accountability. The focus of this project was to statistically analyze these data, to determine whether there are significant differences in the proportions of positive responses to the questions before and after the education program. A variety of statistical methods was used including matched pairs analysis and regression.

URLs:
https://carecenter-okc.org/
https://www.schoolreportcard.org/

Valdez

HIGH-ALTITUDE ROCKETRY AND MID-FLIGHT DRONE DEPLOYMENT

Author(s): **Tayler Valdez** and Dr. Wayne Trail
University of Scholar: Southwestern Oklahoma State University (SWOSU)
Location of Research: SWOSU, Weatherford, Oklahoma, United States of America

Funding: OK-LSAMP

Mentor(s): Dr. Wayne Trail, Southwestern Oklahoma State University.

When using high-powered rockets to deliver a payload to a specified location using drone technology, the act of deploying the drone itself is arguably the most important part of the process. The first step to experimenting with drone deployment is to build prototypes using relatively inexpensive cardboard rockets to test designs before modifying an expensive fiberglass rocket. This project is the beginning stage of such experimentation. At this stage it is crucial to build a rocket (or several) capable of a successful flight that may be fitted with onboard electronics to collect the desired data (accelerations, altitudes, etc.). These all should be somewhat inexpensive to minimize losses in the event of a crash, therefore homemade electronics and cardboard rockets serve as perfect test subjects.

Wagner

The flagellum in silico: using supercomputers to shed light on how microalgae move

Joseph Wagner[1],*, Ann Almgren2, Johannes Blaschke2, Gang Xu3
1 Department of Engineering and Physics
2 Lawrence Berkeley National Lab
3 Department of Engineering and Physics

In previous studies it has been determined that active green algae can play a vital role in increasing passive diffusivity as a result of the cells' motility; However, the exact reason and relation of algae on these systems has not yet been determined. To determine the source of this diffusivity resulting *Chlamydomonas reinhardtii*, or green algae, motile cells have been modeled in "silico" or computationally. This system was modeled with the use of software from Lawrence Berkeley National Lab (LBNL) developed by the Computational Research Division (CRD). The software used was Fluctuating Hydro Dynamics solver (FHDeX), and Adaptive Mesh Refinement (AMReX). To ensure that the model imitates reality, several iterations of system perimeter scaling were performed to determine the size of the perimeter that produces an acceptable amount of error. This process is a computational balancing act because a more accurate simulation results in one that that requires more time and computational power to complete. Therefore the goal is to balance accuracy and performance by scaling each system perimeter up or down until the system is optimized. Since the project is modeling flagellar beating in an enclosed space, we manipulated the systems size, the flagellum size, the flagellum beating speed frequency, and the flagellum beating force. For this model it was determined that an accurate model can be simulated in a reasonable amount of time allowing researchers to better understand the effects of green algae motility on system diffusivity.

These particle are linked with spring forces which allow them to move together in fluid flow. These particle are then forced by the

SPECIAL THANKS

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OK-LSAMP would especially like to thank the ***National Science Foundation*** and the LSAMP Program Director, ***Dr. A. James Hicks, Ph.D., Martha James and Dr. Sandra Romano, Ph.D.*** for their continued support of both the undergraduate and graduate LSAMP programs.

MOST OF ALL, OK-LSAMP would like to give praise and special thanks to the faculty and industry ***Mentors***. This program would not be the success it is without the expert support and guidance mentors provide to the scholars as they explore and enhance their research and scientific skills. We cannot say "Thank you" enough. OK-LSAMP is eternally grateful for the hard work and dedication of the ***OK-LSAMP Campus Program Managers*** on each campus. Their mentoring and guidance keeps scholars on track academically and professionally so they are ready for the rigors of graduate school, academia and/or industry careers.

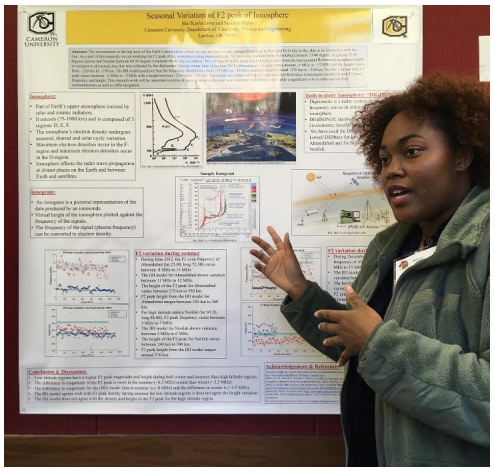
REGISTERED ATTENDEES

NAME	INSTITUTION	DISCIPLINE
Akinwale, Emmanuel	Oklahoma State University	Industrial Engineering & Management
Alcala, Esmeralda	The University of Oklahoma	Microbiology
Alcantar, Isabelle	Oklahoma State University	Mathematics
Allbritton, Elisabeth	Southwestern OSU	Chemistry
Alumbaugh, Alissa	Oklahoma State University	Microbiology & Genetics
Anadu, Josh	Oklahoma State University	Environmental Science
Arreola, Alex	Oklahoma State University	Microbiology & Cell/Molecular Biology
Austin, Aaron	Oklahoma State University	Physics
Avila, Elina	The University of Oklahoma	Environmental Engineering
Azzun, Saramarie	The University of Oklahoma	Social & Behavioral Sciences
Bazile, Patricia	Langston University	Biology
Beker, Beth	Oklahoma State University	Management Information Systems
Bevien Guevarra, Rosemary	Oklahoma State University	Microbiology
Biddy, Trey	Southwestern OSU	Engineering
Blackwell, Alex	Oklahoma State University	Biology
Brown, Kellan	East Central University	Physics
Buchanan, Austin	Oklahoma State University	Industrial Engineering & Management
Castor, Guimy	The University of Oklahoma	Evaluator
Ceniceros, Julia	The University of Oklahoma	Biochemistry
Chambers, Chakari	The University of Oklahoma	Chemical Engineering
Chatman, Priscilla	Oklahoma State University	Microbiology/Cell and Molecular Biology
Chicas Mosier, Ana	Auburn University	Biological Science
Coles, Alexis	Oklahoma State University	Entomology/Pre-Medical Sciences
Coles, Taylor	Oklahoma State University	Entomology/Pre-Medical Sciences
Colston, Nicole	Oklahoma State University	Environmental Science
Conn, Brittney	Oklahoma State University	Microbiology
Cook, Carley	Oklahoma State University	Chemical Engineering
Cravens, Sherman	Langston University	Biology
Croci, Darlene	Oklahoma State University	OK-LSAMP
Crutchfield, Jalen	East Central University	Physics
Das, Subhas	OSU-Center for Health Sciences	Biochemistry/Microbiology
Daugherty, Cheyenne	Oklahoma State University	Microbiology
Davidson, Madissen	Oklahoma State University	Microbiology

NAME	INSTITUTION	DISCIPLINE
Determann II, Brenden	Oklahoma State University	Microbiology & Molecular Genetics
Dew, Jovette	Oklahoma State University	Assistant VP for Institutional Diversity
Dickens, Ramon	Oklahoma State University	Construction Engineering Tech
Dixon, Kierra	Oklahoma State University	Zoology & Microbiology
Dominick, Brenden	Oklahoma State University	Mechanical Engineering
Dreadfulwater, Stormie	Oklahoma State University	Microbiology/Cell and Molecular Biology
Dunlap, Rylee	Southeastern OSU	Biomedical Sciences
Easter, Katie	Northeastern State University	Biology
Eberhard, Alissa	Northeastern State University	Cell and Molecular Biology
Elliston, Makayla	Oklahoma State University	Animal Science
Eslinger, Christy	OSU-Center for Health Sciences	Biomedical Sciences
Ethridge, Lauren	The University of Oklahoma	Psychology & Pediatrics
Flores, Karina	NYU School of Medicine	Biology
Flusche, Ann Marie	The University of Tulsa	Cancer Biology
Ford Versypt, Ashlee	Oklahoma State University	Chemical Engineering
Garcia, Leslie	Southwestern OSU	Chemistry
Garcia, Getsi	East Central University	Biology
Germany, Kaylie	Langston University	Biology
Gonzales, Andrew	The University of Oklahoma	OK-LSAMP Scholar/Student
Hadwiger, Jeff	Oklahoma State University	Microbiology & Molecular Genetics
Haley, Joseph	Oklahoma State University	Physics
Hartnett, Rachel	Oklahoma State University	Integrative Biology
Hawkins, Ashlee	Oklahoma State University	Microbiology
Hazra, Susmita	Cameron University	Physics
Heard, Samuel	The University of Oklahoma	Mathematics
Herrera, Brandy	The University of Oklahoma	Mathematics
Hubin, Tim	Southwestern OSU	Chemistry
Huck, Lori	Oklahoma State University	Geology
Hussaini, Syed	The University of Tulsa	Organic Chemistry
Hutchison Ybarra, Julissa	The University of Oklahoma	Mathematics
Ismail, Ahmed	Oklahoma State University	Physics
Iyer, Janaki	Northeastern State University	Biology
Jacobs, Sue	Oklahoma State University	Counseling Psychology
Jimenez, Stacy	Oklahoma Panhandle State University	Biological Sciences
Johnson, Emily	Oklahoma State University	Microbiology/Cell and Molecular Biology
Kara, Kursat	Oklahoma State University	Aerospace Engineering
Kim, Seok Jhin	Oklahoma State University	Engineering
Kirksey, Jason	Oklahoma State University	Vice President for Instutuional Diversity
Kouplen, Kate	Oklahoma State University	Biology
Lee, Chunghao	The University of Oklahoma	Bioengineering/Mechanical Engineering

NAME	INSTITUTION	DISCIPLINE
Lewis, Sharon	Langston University	Biochemistry
Love, SheKayla	Cameron University	Physics
Lutter, Erika	Oklahoma State University	Microbiology
Madden, Destiny	Langston University	Nasa intern
Manjarrez, Jacob	OSU-Center for Health Sciences	Biochemistry
Mares, Sergio	Oklahoma State University	Microbiology & Molecular Genetics
Markham, Sydney	Oklahoma State University	Microbiology
Maxwell, Matthew	University of California, San Diego	Biology
McAdoo, Ashtyn	Southwestern OSU	Chemistry
McCullagh, Elizabeth	Oklahoma State University	Neuroscience
McGill, Imani	Oklahoma State University	Microbiology & Molecular Genetics
Merchan Breuer, Duncan	The University of Oklahoma	Mechanical Engineering
Merchan Merchan, Wilson	The University of Oklahoma	Aerospace & Mechanical Engineering
Metcalf, Justin	The University of Oklahoma	Electrical Engineering
Mitra, Avishek	Oklahoma State University	Cell & Molecular Biology
Monks, Jordon	Southwestern OSU	Chemistry
Moore, Kristin	Langston University	Biology
Mora, Teri	Oklahoma Panhandle State University	Mentor
Morales, Brenda	Oklahoma State University	OK-LSAMP
Mullins, Duncan	Oklahoma State University	Chemical Engineering
Nagel, Marli	Southeastern OSU	Chemistry/Biology
Nail, Kayli	Oklahoma State University	Biology
Nalley, Elizabeth	Cameron University	Chemistry
Newkirk, Christian	The University of Oklahoma	Mechanical Engineering
Nimsey, Abner	Southwestern OSU	Chemistry
Oz, Furkan	Oklahoma State University	Mechanical Engineering
Patterson, Eian	The University of Oklahoma	Chemistry/Biochemistry
Payan, Miguel	The University of Oklahoma	Architectural Engineering
Portillo, Dylan	The University of Oklahoma	Chemical Engineering
Posey, Sierra	Oklahoma State University	Microbiology & Molecular Genetics
Prado, Stephanie	The University of Oklahoma	Mechanical Engineering
Ramanathan, Ranjith	Oklahoma State University	Animal & Food Sciences
Ray, Shawn	Oklahoma State University	Electrical Engineering
Robles, Lucero	Oklahoma Panhandle State University	Biological Science
Rosas, Daisy	East Central University	OK-LSAMP
Salazar, Fernando	East Central University	Physics
Salinas, Casandra	Oklahoma State University	Microbiology & Molecular Genetics

NAME	INSTITUTION	DISCIPLINE
Salinas, Daniel	Oklahoma State University	Mechanical Engineering
Sankey, November	Oklahoma State University	Microbiology
Scroggins, Sabrina	University of Iowa	Immunology and Perinatal Biology
Seagraves, Nikki	University of Central Oklahoma	Cell & Developmental Biology
Siegle, Reese	East Central University	Biology
Soemantri, Ethan	The University of Oklahoma	Mechanical Engineering
Stell, Makya	The University of Oklahoma	Computer Engineering
Steward, Heath	Oklahoma State University	Natural Resource Ecology & Management
Sutton, Autumn	Oklahoma State University	Entomology/Plant Pathology
Thomas, Haryana	Oklahoma State University	Mathematical Biology
Thomas, Lexus	Southeastern OSU	Biology/Chemistry
Tucker, Ryleigh	University of Central Oklahoma	Statistics
Ubani Ochoa, Ngozi	Lockheed Martin Aeronautics	Engineering
Valdez, Cammi	Northeastern State University	Chemistry
Valdez, Tayler	Southwestern OSU	Engineering Physics
Valenzuela, Jordan	Southwestern OSU	Biochemistry
Vaughan, Mel	University of Central Oklahoma	Cell Biology
Velsaco, Jesse	The University of Utah	Biochemistry
Vora, Hitesh	Oklahoma State University	Engineering
Vuppala, Rohit	Oklahoma State University	Mechanical and Aerospace Engineering
Wagner, Joseph	University of Central Oklahoma	Mechanical Engineering
Watson, Caleb	East Central University	Molecular Biology
Whalen, Sandra	The University of Oklahoma	Evaluator
Wheeler, Aaron	Cornell University	Chemical Engineering
White, Nicholas	Southeastern OSU	Chemistry
Williams, Karen	East Central University	Physics
Wilson, Clyde	Oklahoma State University	Assistant VP for Institutional Diversity
Wilson, Marissa	Langston University	Biology
Wozniak, Karen	Oklahoma State University	Microbiology
Wu, Ning	Southeastern OSU	Biomedical Sciences
Xu, Gang	University of Central Oklahoma	Engineering/Physics
Yousefian, Farzad	Oklahoma State University	Industrial Engineering
Zackary, Stephanie	Oklahoma State University	Counseling Psychology



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