Saturday, November 3rd, 2018
Oklahoma State University
Noble Research Center
Stillwater, Oklahoma

# The Oklahoma Louis Stokes Alliance for Minority Participation

# 24th Annual Research Symposium


# CONFERENCE PRESENTATION OPPORTUNITIES

Scholars you are strongly encouraged and urged to present your research at the following conferences.

## 33rd Annual National Conference on Undergraduate Research

Kennesaw State University

April 10 - 13, 2019

## Oklahoma Research Day

March 8th 2019

Southwestern Oklahoma State University,
Weatherford, Oklahoma
Pioneer Cellular Event Center


**Society for Advancement of**
**Chicanos/Hispanics and Native Americans in Science (SACNAS)**

*Check in late spring for travel scholarships and abstract submissions*

http://sacnas.org

# OK-LSAMP 24th Annual Research Symposium

# AGENDA

| | | | |
|---|---|---|---|
| 8:30 AM - 11:00 AM | Registration/ Check-In | Poster Set-up: ALL POSTERS MUST BE IN PLACE BY 9AM<br>Refreshments available | 1st Floor Atrium |
| 9:00 AM - 9:15 AM | Welcome Remarks and Introductions | Brenda Morales, OK-LSAMP Director<br>Jason F. Kirksey, PhD, OK-LSAMP Principal Investigator<br>Vice President for Institutional Diversity, Oklahoma State University | Room 106 |
| 9:15 AM - 10:30 AM | Keynote Speaker | Michael Ceballos, PhD<br>Assistant Professor, Biological Sciences, University of Arkansas | Room 106 |
| 10:30 AM - 10:45 AM | Group Photo | | 1st Floor Atrium |
| 10:00 AM - 10:30 AM | Judges Meeting | Judges Orientation | Room 107 |
| 10:45 AM - 11:00 AM | | BREAK | |
| 11:00 AM - 12:00 PM | Poster Presentations | Each presenter must be by his/her poster | 1st Floor Atrium |
| 10:45 AM - 12:15 PM | Alliance Meeting | OK-LSAMP Administration, Campus Program Managers and Invited Guests | Room 130 |
| 12:00 PM - 12:45 PM | | LUNCH PROVIDED | 1st Floor Atrium |
| 12:30 PM - 1:45 PM | Oral Presentations | *For Specific Times, See "Presentations Listed Alphabetically"*<br>Biological Sciences & Chemistry<br>Biological Sciences<br>Mathematics & Physics<br>Engineering | <br>Room 108<br>Room 207<br>Room 246H<br>Room 348B |
| 12:45 PM - 3:00 PM | Workshop | Graduate Research Fellowship Program<br>Prepare To Apply As An Undergraduate Student<br>Michael Thompson, PhD<br>Director of Broader Impacts in Research, University of Oklahoma | Room 106 |
| 1:45 PM - 2:00 PM | | BREAK | 1st Floor Atrium |
| 2:00 PM - 3:00 PM | Oral Presentations | *For Specific Times, See "Presentations Listed by Room Number"*<br>NSF OK-LSAMP Bridge to the Doctorate Presentations | <br>Room 348B |
| 2:00 PM - 3:00 PM | LSAMP Alumni Panel | Academia vs. Industry<br>Moderator: Rita K. Miller, PhD, Associate Professor, Biochemistry & Molecular Biology, Oklahoma State University<br>Panelists: Milecia McGregor, Guillermo Morales, Allison Sherier, & Jadith Ziegler | Room 108 |
| 2:00 PM - 3:00 PM | Workshop | Proper Etiquette for Conferences and Business Receptions<br>Nadia Hall, Coordinator of Graduate Recruitment & Student Services, University of Tulsa | Room 207 |
| 3:10 PM - 3:30 PM | Awards Presentation | 1st, 2nd, and 3rd Place Presentations<br>Life Science Poster Presentations<br>Non Life Science Poster Presentations<br>Oral Presentations | Room 106 |
| 3:30 PM | Closing Remarks | Jovette Dew, PhD, Assistant Vice President for Institutional Diversity, Oklahoma State University | Room 106 |

## PLEASE VISIT ATRIUM TABLES THROUGHOUT THE DAY.

*Note: Symposium volunteers are designated on their name badges. They will gladly assist if you need information or directions.

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# INFORMATION TABLES

University of Tulsa Graduate School

University of Oklahoma Graduate College

Oklahoma State University Graduate College

University of North Texas (UNT) Health Science Center

OSU Interdisciplinary Toxicology Graduate Certificate Program

Oklahoma State University Horticulture REU

University of Oklahoma Health Sciences Center

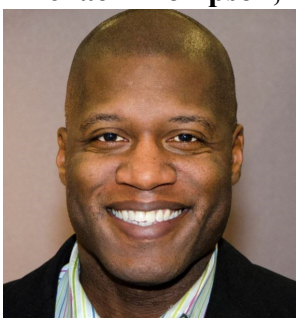
# KEYNOTE SPEAKER

Dr. Ruben Michael Ceballos (O'dami/Tepehuano) is an Assistant Professor in Biological Sciences at the University of Arkansas (Fayetteville, AR). He is a faculty affiliate of the UA Cell and Molecular Biology (CEMB) program as well as the UA Space and Planetary Sciences (SPAC) program. Dr. Ceballos complete a bachelor of science degree in Physics and Mathematics at the University of Alabama in Huntsville, a master's degree in Behavioral Neuroscience from the University of Alabama at Birmingham, and a doctorate (PhD) in Integrative Microbiology and Biochemistry from the University of Montana (Missoula, MT). He was an Alfred P. Sloan Indigenous Graduate Program Fellow, NASA MIRS Awardee, NSF IGERT PhD Graduate, and Ford Foundation Dissertation Fellowship Awardee. Dr. Ceballos has published peer-reviewed journal articles in a variety of disciplines, including: extremophile microbiology, antioxidant and antimicrobial properties of tribal-use plants, transmission of bacterial pathogens between wild ungulates and livestock, and biofuels technology. More recently, in 2017, he published a book entitled, "Bioethanol and Natural Resources: Substrates, Chemistry, and Engineered Systems". Dr. Ceballos has a career funding portfolio that exceeds $4 million in external funding as a principal investigator. He enjoys extensive collaborations both within the U.S. and abroad and has conducted research and student training in a host of countries, including: Norway, Mexico, India, Malaysia, Costa Rica, El Salvador, Vietnam, and Thailand.

In his spare time, he sleeps.

**Graduate Research Fellowship Program: Prepare To Apply As An Undergraduate Student** ***12:45pm (Rm 106)***

**Michael Thompson, PhD**, presenter



Dr. Michael Thompson is the Founding Director of the Broader Impacts in Research (BIR) organization for the University of Oklahoma. BIR seeks to help all faculty be more impactful and successful in their professional endeavors. BIR also serves as a point of contact to bring institutional and state-wide infrastructure as well as help others gain knowledge and get help in developing, implementing, and evaluating high quality broader impact programs and portfolios for and beyond Agency and National Science Foundation (NSF) Criterion. BIR Website: http://bir.ou.edu/. Dr. Thompson has helped to bring in over a million dollars ($1,000,000) to students for graduate education through the GRFP in the last three years.

**Proper Etiquette for Conferences and Business Receptions** ***2:00pm (Rm 207)***

**Nadia Hall**, presenter

Nadia Hall has had the pleasure of pursuing her passion for student success while working in higher education for the past 15 plus years. She is currently in the third year of her doctorate in Educational Leadership at Oklahoma State University. She is from Tulsa where she graduated from Cascia Hall Preparatory School and received both her Bachelor's and Master's in Education from The University of Tulsa. She currently works as the Coordinator for Graduate Recruitment and Student Services in The University of Tulsa Graduate School.

**Academia vs. Industry LSAMP alumni panel** ***2:00pm (Rm 108)***

**Rita Miller, PhD**, moderator

Dr. Rita K. Miller is an Associate Professor of Biochemistry and Molecular Biology at O.S.U., Stillwater. Concurrently, she is serving as a rotating Program Director at the National Science Foundation in the Molecular and Cellular Biosciences Division in the Biosciences Directorate (BIO/MCB). Dr. Miller's laboratory at O.S.U. studies the regulatory mechanisms that control microtubules, a protein polymer that is critical for separating the genetic material during cell-division. Dr. Miller earned her Ph.D. at Northwestern University Medical School. She conducted her postdoctoral work at Princeton University, where she identified one of the first linkages between the two major cytoskeletal-polymer systems in cells. Dr. Miller's research is currently funded by the National Institutes of Health, the National Science Foundation, and NASA. Dr. Miller has mentored several OK-LSAMP scholars in previous years.

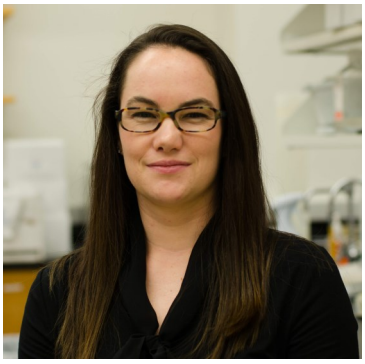
**Panelists:**

**Milecia McGregor**

Milecia McGregor is a software engineer. She has her bachelor's and master's degrees in mechanical and aerospace engineering. She has presented research both nationally and internationally in the field of machine learning and autonomous robotics. Milecia is also a published author of a web development book and owns her own business teaching people how to become web developers. She actively volunteers in her community and tries to encourage minorities and women to go into STEM fields. She currently resides in Tulsa, OK.

**Guillermo Morales**

Guillermo "Willy" Morales received his Bachelors in Aerospace Engineering from the University of Oklahoma in 2013. He is currently a Structural Analysis Engineer at the Boeing Company in OKC. He has worked on the sustainability and modernization of aircraft such as the KC-135 Tanker, B2 & B-52 Bombers, and VC-25 (Air force One). Prior to joining Boeing, he interned at NASA Langley and Spirit AeroSystems, which he describes as incredible experiences. He is currently enrolled in the Master of Science in Engineering & Technology Management (MSETM) program at Oklahoma State University. Currently at Boeing, he serves as the Chair for the Diversity Council and Co-Chair for the Employee Community Fund. Externally, he is a board member for Cristo Rey Catholic School and for the Foundation for Oklahoma City Public Schools. Willy has created a scholarship in his name which he awards every year to a graduating senior from Santa Fe South. He was selected as one of the 2016 *NextGen under 30* award recipients in the STEM category. He is married to his lovely wife Tracey Morales, has two very fun and energetic dogs, and is expecting their first baby in October.



**Allie Sherier**

Allie Sherier received her Bachelors of Science in Animal Science Biotechnology (2014) from Oklahoma State University (OSU). During her time at OSU she was selected as a Freshman Research Scholar, Animal Science Freshman Scholar, Scholars in Science: Native American Path Scholar, and a Wentz Research scholar while working in two different research laboratories in the Animal Science Department. Outside of the lab she was involved with Alpha Zeta (an Animal Science honor society), OK-LSAMP, SACNAS, Pete's Pet Posse, and was a regional coordinator for Cardigan Welsh Corgi National Rescue Trust. Allie received her Masters of Science in Forensic Science from OSU Center for Health Sciences (2016) and selected as a Bridge to the Doctorate National Science Foundation Fellow. After completing her M.S. she moved to University of North Texas Health Science Center in Fort Worth, Texas, where she is currently in her 3rd year of her doctoral program in Biomedical Sciences. Her doctoral research is focusing on investigating the human skin microbiome as an alternative source of DNA for human identification. After completing her Ph.D., Allie hopes to work for the government in a crime lab setting focusing on data analysis and massive parallel sequencing.

**Jadith Ziegler, PhD**

Dr. Jadith A. Ziegler is from sunny California. She attended Brigham Young University for her Bachelors of Science in Sociology. Additionally, she attended Cameron University in Oklahoma and studied Cell Biology. For her Ph.D., Jadith attended the University of Oklahoma Health Sciences Center to study biomedical sciences. Her research focused on Glioblastomas, brain tumors, in the Pathology department. Jadith now is a Post-Doctoral Research Fellow at OUHSC/Dean McGee Eye Institute and studies corneal stem cells. She is also an Adjust Professor of Biology at the Oklahoma City Community College. She has two boys and two cats and hope to travel the world someday.

# 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, 11 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 2017-2018 academic year, the Oklahoma alliance increased the number of scholars by 16% in comparison to the 2016-2017 academic year. Of those 314 Scholars, 88 completed Bachelor of Science degrees and 24 of the graduates were admitted to graduate schools for a total of 27% of scholars. During the academic year 151 (48%) of the alliance scholars participated in research activities, and 96 (31%) of the scholars, participated in summer internship experiences at national and international locations.

# 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 director of the African American Studies Center and 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 11 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 recently finished a five year term serving 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**
***Michael Husak***, Ph.D., 580-581-2374, michaelh@cameron.edu
Dr. Husak received a BS and MS in biology from Angelo State University and a Ph.D. in biological sciences with an emphasis in ecology and evolution from Mississippi State University. He is currently an Associate Professor of Biology at Cameron University and the Curator of the Cameron University Museum of Zoology. Dr. Husak's research interests include vertebrate ecology and the evolution of life history strategies in birds.

**East Central University**
***Karen Williams***, Ph.D., 580-559-5394, kwillims@ecok.edu

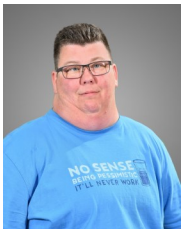
Dr. Williams earned a BS in Physics and Mathematics from Arkansas Tech University, a MS in Physics from the University of Arkansas, and a PhD in Physics Education from The University of Oklahoma. Her research interests are varied from how students learn physics to ultrasound physics to applying photothermal 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, salewis@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**
***Camille Frye DeYong,*** Ph.D., 405-744-6055, camille.deyong@okstate.edu

Dr. DeYong received a BS in math education and MS and PhD in Industrial Engineering and Management from Oklahoma State University. Her research interests include organizational performance metrics, quality management and customer satisfaction measurement. She is an Associate Professor in Industrial Engineering and Management at OSU.

**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**

***Brad Ludrick***, Ph.D., 580-745-2668, bludrick@se.edu

Dr. Ludrick received his BS in biology and a M.Ed. in science education from Southeastern Oklahoma State University. At Texas A & M, he received an Ed.D. in science education. His research interests include studying the nematicidal effects of transformed Escherichia coli in small ruminants and improving the scientific inquiry skills of the secondary science teacher. Dr. Ludrick is an Associate Professor in the Department of Biological Sciences.

**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 Full Professor in the Biology Department.

**University of Oklahoma**

***Susan Walden***, Ph.D., 405-325-7407, susan.walden@ou.edu

Dr. Walden received her BS in chemistry from Arkansas State University and a MS and Ph.D. in computational organic chemistry from the University of Oklahoma. She is currently the director of the Research Institute for STEM Education (RISE) in the College of Engineering at OU and the Director of the Office of Undergraduate Research in the Vice President for Research Office. Dr. Walden's research uses primarily qualitative methods to study how the complex milieu of factors such as faculty cultural competency, institutional policies, and academic cultures intersect with students' race, ethnicity, socio-economic background, and cultural capital to contribute to students' academic experiences and eventual success in STEM majors.

**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 | University | Discipline | Time | Room # |
|---|---|---|---|---|---|
| Elisabeth | Allbritton | SWOSU | Chemistry | 12:50-1:05 | 108 |
| Charles | Bales | TU | Electrical Engineering | 1:10-1:25 | 348 |
| Dylan | Barber | ECU | Theoretical Physics/ Celestial Mechanics | 1:10-1:25 | 246 |
| Carley | Eastep | OSU | Chemical Engineering | 1:30-1:45 | 348 |
| Karina | Flores | OU | Biology | 1:30-1:45 | 108 |
| Daniel | Hayden | OU | Plant Biology | 1:10-1:25 | 207 |
| Tayler | Hedgecock | SE | Biology | 12:30-12:45 | 108 |
| Brandy | Herrera | OU | Mathematics | 12:50-1:05 | 246 |
| Sean | Jesse | ECU | Mathematics | 12:30-12:45 | 246 |
| Luis | Juarez | TU | Chemical Engineering | 12:50-1:05 | 348 |
| Arissa | Mercer | SWOSU | Biology | 1:10-1:25 | 108 |
| Cayla | Moore | LU | Natural Science | 1:30-1:45 | 207 |
| Stephanie | Prado | OU | Mechanical Engineering | 12:30-12:45 | 348 |
| Casandra | Salinas | OSU | Biochemistry and Molecular Biology | 12:50-1:05 | 207 |
| Ayrianna | Swanson | OSU | Microbiology | 12:30-12:45 | 207 |

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| Tayler | Hedgecock | SE | Biology | 12:30-12:45 | 108 |
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| Karina | Flores | OU | Biology | 1:30-1:45 | 108 |
| Ayrianna | Swanson | OSU | Microbiology | 12:30-12:45 | 207 |
| Casandra | Salinas | OSU | Biochemistry and Molecular Biology | 12:50-1:05 | 207 |
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| Cayla | Moore | LU | Natural Science | 1:30-1:45 | 207 |
| Sean | Jesse | ECU | Mathematics | 12:30-12:45 | 246 |
| Brandy | Herrera | OU | Mathematics | 12:50-1:05 | 246 |
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| Stephanie | Prado | OU | Mechanical Engineering | 12:30-12:45 | 348 |
| Luis | Juarez | TU | Chemical Engineering | 12:50-1:05 | 348 |
| Charles | Bales | TU | Electrical Engineering | 1:10-1:25 | 348 |
| Carley | Eastep | OSU | Chemical Engineering | 1:30-1:45 | 348 |

# BRIDGE TO THE DOCTORATE
# ORAL PRESENTATIONS

| | | | | | |
|---|---|---|---|---|---|
| Ana | Chicas-Mosier | OSU | Interdisciplinary Toxicology | 2:00-2:15 | 348 |
| Zach | Ridge | OSU-CHS | Forensic Chemistry | 2:20-2:35 | 348 |
| Justin | Bowen | OSU | Microbiology and Molecular Genetics | 2:40-3:55 | 348 |

# ORAL PRESENTATION ABSTRACTS

**Room 108**
**12:30-12:45**

**Reserpine rodent model of depression: molecular mechanism and its efficacy**

Tayler Hedgecock, Abigail Phillips, Brad Ludrick, Teresa Golden, Ning Wu
Department of Biological Sciences, Southeastern Oklahoma State University, Durant, OK 74701

Reserpine, an indole alkaloid isolated from the Rauwolfia serpentina, has been around since the 1950s. This compound, used for hypertension treatment, had undesirable side effects in patients. The most notable side effect of inducing depression. Reserpine's action is that it binds irreversibly to the VMAT2 receptor on biogenic amine storage vesicles. This, in turn, causes the storage vesicles to leak their contents into the neuronal cytosol. Cytosolic enzymes such as Monoamine Oxidases then, in turn, catabolize neurotransmitters, namely Serotonin (5-HT), Dopamine (DA), and Norepinephrine (NE). The depletion of these biogenic amines leads to an increase in depressive-like behavior in various rodents. In addition to inducing a depressive state, traits associated with pain were also observed in rodent models. Pain is an important characteristic that is comorbid in patients with major depressive disorder, often referred to as the pain-depression dyad. The extent of the induced-depressive state can be determined based on several proven tests such as the forced swimming test, open field test, and von Frey Hair test. Reserpine also induced visible and empirical changes in rodent behavior such as akinesia, ptosis, and hypothermia to name a few. Reserpine shows efficacy as a suitable model of depression in rodents to further the study of this disease at the molecular and systemic levels.

**Room 108**
**12:50-1:05**

**ROUTES TO CROSS-BRIDGED PENTAAZAMACROCYCLIC LIGANDS**

Author(s): **Elisabeth M. A. Allbritton**
University of Scholar: Southwestern Oklahoma State University, Weatherford, OK, USA
Location of Research: Southwestern Oklahoma State University, Weatherford, OK, USA
Funding: the National Science Foundation (NSF) the National Institutes of Health (NIH)
Mentor(s): Dr. Tim Hubin, Southwestern Oklahoma State University

Ethylene cross-bridged tetraazamacrocycles, those with four nitrogen atoms with which to bind a transition metal ion, have become standard ligands when the complexes produced must survive harsh aqueous conditions. The cross-bridge increases topological complexity and rigidity of the complex, and thus its kinetic stability. Applications requiring such stability include "green" aqueous oxidation catalysis, biomedical imaging, and bioinorganic therapeutic compounds. A tenet of coordination chemistry is that adding donor atoms (nitrogens) to the ligand should improve the stability of the resulting complex, as more donors are harder to remove from the metal ion than fewer. To address this hypothesis, we have designed two routes to cross-bridged pentaazamacrocycles. First, we have designed the first propylene cross-bridged pentaazamacrocycles beginning from the parent 15aneN5 macrocycle. Second, we have worked towards adding a primary amine pendant arm to the known ethylene cross-bridged tetraazamacrocycles. Both approaches will lead to novel ligands and complexes. Synthetic and characterization methods and results for these novel compounds will be presented.

**Room 108**
**1:10-1:25**

**THE EFFECTS OF BEHAVIORAL INTERACTIONS ON THE FEEDING HABITS OF AMPHIPOD SPECIES**

Authors: **Arissa Mercer** and Rickey Cothran
University of Scholar: Southwestern Oklahoma State University
Location of Research: Southwestern Oklahoma State University, Weatherford, Oklahoma, USA
Funding: OK-LSAMP
Mentor: Rickey Cothran, Southwestern Oklahoma State University, Biology Department

Feeding habits of amphipods are not well known, but could help explain the outcome of behavioral interactions between species and their ability to coexist in nature. This study examines the algal food preference of two cryptic species (species that are very similar in phenotype of amphipods in the genus *Hyalella.* These cryptic species are thought to differ in ability to avoid predators and use resources by their size. The feeding habits of an amphipod may be altered by interactions with other amphipod species by exploitation (one species being better at finding food than the other) or interference (directly attacking other species or protecting the food source.) We hypothesized that each amphipod species will prefer algae that offers a greater nutrient quality. We also expected that when multiple amphipod species are competing, the larger species would displace the smaller species, through interference competition, from high nutrient quality food. To test these hypotheses, each amphipod species will be put in an arena with algae that vary in quality to determine foraging preferences. The amphipods will then be tested together to discover if food preferences change based on interactions with each other as species B has been found to be a greater competitor. This study will give us greater insight into food preferences of amphipod species, but also what role interspecific competition plays in resource use and perhaps the ability of amphipod species to coexist in nature.

**Room 108**
**1:30-1:45**

**PREVALENCE OF AVIAN MALARIA PARASITES AND HOST-SPECIFICITY IN TROPICAL BIRDS IN PRE MONTANE WET FOREST OF SOUTHERN COSTA RICA**

Author(s): **Karina Flores** and Juan Rivero
University of Scholar: The University of Oklahoma, Norman, OK, USA
Location of Research: Las Cruces Biological Station, Costa Rica
Funding: the National Science Foundation (NSF) and the Louis Stokes Alliance for Minority Participation (LSAMP)
Mentor(s): Dr. Juan Rivero de Aguilar, Universidad de Chile

Avian malaria is an infectious disease caused by the protozoan *Plasmodium* and two other closely related parasites: *Haemoproteus* and *Leucocytozoon*. It is transmitted through a dipteran vector in tropical and subtropical environments. These blood parasites can cause detrimental effects in fitness and reproductive success. Throughout Costa Rica's elevation gradient in the Cordillera Central over 260 species of birds are found. The large diversity of bird species can serve as an agent in host availability for parasites and their preference, acting as generalists or host specific. However, earlier studies on blood parasites were from different areas of Neotropical forested regions. The objective of our study is to record malaria blood parasite diversity in tropical birds from premontane wet forest in southern Costa Rica and determine host-parasite relationships as generalist/host-specific. Using optical microscopy, we found 4 birds to be infected with a *Haemoproteus* spp. and one with a *Plasmodium* spp. for an overall rate of 5.31% infection. Infections with *H. fallisi* were seen in White-throated Antthrush (*Turdus assimilis)* and Rufous-capped Warbler (*Basileuterus ruffrons)* meanwhile *H. archilocus* was detected in a Rufus-tailed Hummingbird (*Amazilia tzacatl)*. One infection of *Haemoproteus* and *Plasmodium* were not identifiable to its species due to complex morphology. Infections with *H. archilocus* and *H. fallisi* were found to behave as generalists.

**Room 207**
**12:30-12:45**

**Short Exercise Intervention using Data Acquisition Air Pressure Pillow (DAQ APP): A Pilot Study for CKD Patients**

Melissa Ruiz[1], Ayrianna Swanson[2], Cheng-Lin Lu[3], Cheng-Ting Lin[3], Lan-Yuen Guo[3]
[1]San Diego State University, San Diego, California, USA
[2]Oklahoma State University, Stillwater, OK, USA
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Chronic Kidney Disease is defined as kidney damage, compromised renal function, or a GFR <60 mL/ min per 1.73m^2 for at least three months. In this study, based off other experiments with exercise interventions with CKD patients, we designed a protocol for an exercise program with the DAQ Air Pressure Pillow to test knee extensor strength. Subjects were recruited to participate in a 2-week exercise intervention. Subjects completed three sets of 15 leg press repetitions, three times per week. It was determined that participant leg extensor force before and after the exercise intervention was positively and strongly correlated ($r=.908$, $p<.001$). However, there was no significant difference between leg extensor force before and after the intervention [$t(9)=.468$, $p=.651$). We were able to ensure the safety and feasibility of the DAQ APP and intend to apply the knowledge we gained about our exercise intervention to a subsequent study with stages 3 through 5 CKD.

**Room 207**
**12:50-1:05**

**ABNORMAL ION CONCENTRATION IN CYSTIC FIBROSIS LUNGS IMPACT ON *PSEUDOMONAS AERUGINOSA'S* RHAMNOLIPID PRODUCTION**

Author: **Casandra Salinas**
University: Oklahoma State University
Location of Research: Department of Microbiology and Molecular Genetics, Oklahoma State University, 304A Life Sciences East, Stillwater, OK 74074
Funding: OK-LSAMP and McNair
Mentor(s): Dr. Marianna A. Patrauchan and PhD student Michelle King

*Pseudomonas aeruginosa* can cause severe opportunistic infections in immunocompromised patients, most notably infecting the lungs of patients with cystic fibrosis. Due to its high adaptation, resistance and survival, discovering innovative treatments is a top-priority. This pathogen exhibits different types of motility, swarming being one of the most complex and evaluated due to its importance during infections and virulence factors that are produced. One of these factors is rhamnolipid, which is required for swarming and aids in evasion from the host immune system. The purpose of my research is to determine how the abnormal $Ca^{2+}$concentrations in the lungs of CF patients impact production of biosurfactant rhamnolipid in *P. aeruginosa* motile strains, both laboratory and clinical.

**Room 207**
**1:10-1:25**

**ALTERING CELL WALL COMPONENTS INCREASES BENEFICIAL FUNGAL COLONIZATION OF RICE ROOTS**

Author(s): **Daniel Hayden**, Dr. Uta Paszkowski, and Dr. Laura Bartley
University of Scholar: University of Oklahoma
Location of Research: University of Oklahoma, Norman, OK, USA
Funding: OKLSAMP, McNair, NSF
Mentor(s): Dr. Laura Bartley; University of Oklahoma

Cereal crops are critical for producing food, feed, fiber, and potential industrial chemicals. Arbuscular mycorrhizal fungi (AMF), a beneficial root-colonizing symbiont, increases plant nutrient and tolerance to environmental stresses. Grasses, including cereals, possess acyltransferases that decorate their cell walls with phenolic compounds like ferulic acid (FA). FA crosslinks cell wall components and increases cell wall integrity. FA crosslinks could act as a physical barrier to AMF, decreasing AMF colonization. This experiment tested this hypothesis by inoculating the rice acyltransferase mutant, AT10-D1, which has 10-60% less FA, with AMF spores of *Rhizophagus irregelius*. AMF colonization increased in pooled AT10-D1 roots relative to wild-type roots by 2-fold at 3 weeks ($p < 0.05$) and by 1.5-fold at 6 weeks ($p < 0.05$) post inoculation. Furthermore, the lateral roots that grow from the main roots and are most colonized by AMF did not exhibit a significant increase in AT10-D1 at either 3 and 6 weeks post inoculation, though increases were observed in wild-type roots. Assuming most colonization occurred on the lateral roots, the calculated ratio of AMF colonization to lateral root number for AT10-D1 increased by 2-fold at 3 weeks and 4-fold at 6 weeks relative to the wild-type. These results indicate AMF colonization in AT10-D1 may be greatly enhanced in the lateral roots due to the reduction of FA crosslinking, facilitating AMF proliferation within the roots. Cereal crops with enhanced AMF colonization might attain higher efficiency in nutrient uptake and better survive environmental stresses exacerbated by climate change.

**Room 207**
**1:30-1:45**

**HYDROCORTISONE DECREASES THE PROLIFERATION RATE AND INCREASES ANTIBIOTIC RESISTANCE OF *STREPTOCOCCUS PNEUMONIAE***

Cayla A. Moore[1], Colette Ngo Ndjom, M.S.[2] and Harlan P. Jones, Ph.D.[2],
[1]Department of Biology, Langston University, Langston, Oklahoma 73050
[2]Institute of Molecular Medicine, University of North Texas Health Science Center, Fort Worth, Texas 76107

The ecosystems of microbial species that reside on and within humans play an important role in health and disease. Microbial endocrinology is a transdisciplinary field which bridges neurophysiology and microbiology, focused on understanding the relationship between neuroendocrine responses' influence on microbial physiology. Such interplay is believed to have a significant impact on human health and disease.

*Streptococcus pneumoniae (S. pneumoniae)* is a common commensal and opportunistic pathogen of the respiratory tract. *S. pneumoniae* is the cause of significant mortality rates in the United States and worldwide, particularly among the chronically ill and individuals with poor immune function. Previous studies in our laboratory have demonstrated that corticotrophin-releasing hormone can directly influence the growth and virulence of *S. pneumoniae*. Researchers have also shown similar effects to norepinephrine.

The **purpose** of the current study was to examine the effects of hydrocortisone on the growth and antibiotic resistance. We **hypothesized** that hydrocortisone exposure would increase the growth and antibiotic resistance of *S. pneumoniae.* Growth curve analysis was performed to determine the effect of various concentrations by which hydrocortisone would influence the growth phase of *S. pneumoniae*. In addition, antibiotic resistance in the presence of hydrocortisone was determined by minimal inhibitory concentration (MIC) analysis.

**Results** demonstrated that hydrocortisone significantly decreased *S. pneumoniae* growth in a concentration-dependent manner. In two independent experiments, *S. pneumonia*e demonstrated increased resistance against penicillin/streptomycin in the presence of hydrocortisone. Our findings suggest a dichotomous relationship between hydrocortisone influence.

Keywords: Antibiotic resistance , hydrocortisone , *Streptococcus pneumoniae* , pathogenesis, microbial endocrinology, minimum inhibitory concentration, microbiota

**Room 246H**
**12:30-12:45**

**Radio Waves to Electricity: Tesla's Blueprint**

Author(s): Sean K.C. Jesse
University of Scholar: East Central University, Ada, OK, USA
Location of Research: East Central University, Ada, OK, USA
Sponsor(s): OK-LSAMP, NASA, Strengthening the Culture Grant, ECU McNair Scholars, ECU Honors Program
Mentor(s): Dr. Andrew Wells, East Central University

The main source for this project came from a blueprint from Nikola Tesla's designs that was presented online along with the main parts needed, which is what most of the build is based on. The objectives of this project included first being able to confirm that it was possible to create electricity (direct current in this case) by means of converting radio waves through the device created, optimization of the creation to produce a better range of electricity generated, and then using the device as a supplemental source of electricity for low-power appliances such as LEDs, rechargeable batteries, and cell phones.

Testing has included the use of antennae at several locations and different times, adjustment of each antenna for the best possible reception (each done separately), and then recording of the amperages and voltages shown by a multimeter connected to the device. Average power calculated from the readings taken has fallen in between 50-400 μW, which is relatively low, but the device works.

**Room 246H**
**12:50-1:05**

This is a validation study of Divergent Paths: A New Perspective on Earnings Differences Between Black and White Men Since 1940, a paper by Charles and Bayer. In light of the Chang (2015) finding that less than half (49%) of economic papers are replicable, such studies are important. Measures of racial earning differences between black and white males over the past 70 years have traditionally left out non-workers in an era of historically large rates of nonwork. Moreover, a focus on the median and mean populations does not give a representation of earning differences at top and bottom of the income distribution.

Several forces over the past 70 years have provided a shrinking of the earnings gap between black and white men. These include the civil rights movement, the desegregation of schools, and convergence in the educational attainment of white and black men. There has also been a rise in nonwork, incarcerations, and a sharply rising return to education in the labor market. Using data that included non-workers and comparing earning differences at the bottom, middle, and top of the earnings distribution, I expect to find similar results to those in the original paper: advances in educational attainment have provided a shrinking of the earnings gap for black men in the 90th percentile, black men in the middle have been negatively affected by returns to education, and black men at the bottom of the distribution have been the most strongly affected by returns to education and the effects of nonwork.

**Room 246H**
**1:10-1:25**

Dylan Barber
10/6/18
Abstract LSAMP Research Symposium

How did the universe begin? Humans have asked this question since the dawn of time. Countless philosophers and theologians have proposed answers, many of which are not logically compatible, and sometimes in contradiction with one another. Figures who have provided arguments concerning the origin of the universe from early history include Kalaam, James Ussher, and even Edgar Allen Poe as well as contemporary figures such as Jason Lisle, William Barker, and Lawrence Krauss. This thesis will consider the arguments presented by some of those individuals with the goal of demonstrating the strength of the traditional Christian, or biblical, argument for creation. Though many modern scientists in astrophysics subscribe to the Big Bang theory, this thesis will show that this account leaves many important questions unanswered, and that it does not genuinely answer crucial epistemological questions concerning the existence of the God the Holy Bible. I will argue that a more concrete account of the origins of the universe is found in the beginning chapters of the book of Genesis, which tell a very detailed account of God and His handiwork in the creation of the entire universe and all its contents. I will represent my position with reference to the following theorists: James White, John MacArthur, Jason Lisle, R.C. Sproul, and Paul Wilson. I shall use the work of these figures to help me demonstrate problems in the arguments provided by my "opposition," namely figures such as Richard Dawkins, the late Stephen Hawking, Lawrence M. Krauss, and Barry Parker. In this essay, I hope to demonstrate not only the strength of the biblical case, in part due to the compatibility of its account with the findings of empirical science, but also that the benefits of accepting this view are considerably convincing.

**Room 348B**
**12:30-12:45**

**DETERMINATION OF THE TOTAL ACID NUMBER IN SELECTED BIODIESEL, BIODIESEL BLENDS, AND DIESEL USING A COLOR INDICATOR TITRATION METHOD**

Author(s): **Stephanie Prado Carbonell** and Wilson Merchan-Merchan
University of Scholar: University of Oklahoma, Norman, OK, USA
Location of Research: School of Aerospace and Mechanical Engineering, Norman, OK, USA
Funding: The National Science Foundation (NSF) and the Mentored Research Fellowship (MRF)

The evaluation of a total acid number (TAN) in a certain type of fuel (petro) is fundamental to its application. This study focuses on the measurement of TAN of selected biodiesel (BD), No. 2 diesel, and its blends (BD/No.2 diesel). BD is a renewable form of fuel created from vegetable oils and animal fats through a transesterification process. Most of the energy consumption in the U.S is due to transportation methods namely internal combustion (IC) engines. IC engines produce high carbon emissions into the environment which can be harmful. Alternatively, BD produces much lower carbon emissions during a combustion process compared to diesel. However, despite the many advantages of BD over petro-fuel, recent research has shown that BD has several disadvantages. One of the main drawbacks of BD are its corrosive properties and hence this study focuses on the measurement of the TAN of several selected BD, No. 2 diesel (for comparison) and BD/No. 2 diesel using color indicator titration method. High TAN values in BD could lead to the increase of corrosion, which can become an issue when used as fuel in an IC engine. The effect of the TAN on fuel blending (BD/No. 2 diesel) was also studied by using various percentages (volumetric) in the mixture. It was found that the TAN value of the No. 2 diesel was measured to be always lower than the TAN of the studied BD. This implies that No. 2 diesel tends to.

**Room 348B**
**12:50-1:05**

**Room Temperature Ionic Liquids (RTILs) as Potential Electrolytes for Silicon Dioxide ($SiO_2$) Electrochemical Reduction to Generate Solar Grade Silicon**

Author(s): **Luis O. Juarez**, James Sharp, and Gabriel LeBlanc
University of Scholar: The University of Tulsa, Tulsa, OK, USA
Location of Research: The University of Tulsa, Tulsa, OK, USA
Funding: Tulsa Undergraduate Research Challenge (TURC), Chemistry Summer Undergraduate Research Challenge (CSURP), The University of Tulsa Shark Tank Kick-Start program, and STEM by Underrepresented Population (STEM-UP)
Mentor(s): Dr. Gabriel LeBlanc, The University of Tulsa and JC Diaz, The University of Tulsa

Crystalline Silica or Silicon Dioxide ($SiO_2$) is one of the most abundant materials in nature. It is present in the earth's crust as stone, soil, and sand. On the other hand, Crystalline Silicon (c-Si) is used for the manufacturing of many optoelectronic technologies, including solar cells, and is a difficult material to obtain from $SiO_2$. The main reason for this complexity is the stability of $SiO_2$ coupled with the high purification standards for practical applications (11N for electronics manufacturing; 6N for solar cells). In theory, a potential method to reduce the cost and time it takes to obtain c-Si from $SiO_2$ is to use Room Temperature Ionic Liquids (RTILs) to suspend $SiO_2$ particles while an electrodeposition process takes place. Two potential RTIL have been identified for this process. However, initial results found that water has a significant impact on the RTIL properties that hinders the electrochemical process. Methods for minimizing water contamination were explored and preliminary test with the $SiO_2$ have shown some promise. Future research will focus on exploring other RTIL candidates based on these initial studies to optimize this strategy.

**Room 348B**
**1:10-1:25**

**DEVELOPING ELECTRONIC CONTROL FOR MAINTAINING MOBILE FSO LINKS**

Author(s): **Charles Bales**
University of Scholar: University of Tulsa
Location of Research: University of Tulsa, Tulsa, OK, USA
Funding: National Science Foundation (NSF), OK-LSAMP
Mentor(s): Dr. Peter LoPresti, University of Tulsa

Current free-space optical (FSO) systems have difficulty tracking moving transceivers and nodes due to a limited field of view (FOV) for the power collecting optics of the receiver. Current commercial FSO systems have an FOV of at most ±0.5°, requiring complex and often large mechanical systems to align the receiver's optical axis to match that of the transmitter with little room for error. The need for high pointing accuracy and the size, weight, and power required for the mechanical alignment systems precludes the use of FSO systems for mobile communication applications, such as air-to-air, ground-to -air, and communication between space assets. A new design developed by Dr. LoPresti implements a fiber-bundle technology that increases receiver FOV to a minimum of ±7° and to a maximum (to date) of ±15°. A downside of the technology is that the bundle, while collecting a large percentage of the input power, has a large diameter which makes coupling of the collected power to an output fiber optic cable difficult. The summer research project focused on exploring the use of photonic lanterns to increase power collection and output coupling of optical power to an optical fiber as a transceiver moves. The research involved the design, implementation and testing of an FSO receiver incorporating a photonic lantern. It consisted of evaluating a photonic lantern system under development at NASA Glenn Research Center, using a model constructed at TU, to characterize its performance as a function of position and angle with respect to the transmitter including power-coupling characteristics. For the output characteristics, the research will measure the signal power.

**Room 348B**
**1:30-1:45**

**MATHEMATICAL MODELING OF THE INFLUENCE OF TOXIN EXPOSURE ON RHEUMATOID ARTHRITIS**

Authors: **Carley Eastep** and Ashlee Ford Versypt
University of Scholar: Oklahoma State University, Stillwater, OK, USA
Location of Research: Oklahoma State University, Stillwater, OK, USA
Funding: Niblack Research Scholars program and OK-LSAMP
Mentor: Dr. Ashlee Ford Versypt, Oklahoma State University

Rheumatoid arthritis is a debilitating autoimmune disease that attacks joints in the body. These attacks cause chronic inflammation that degrades the surrounding bone overtime. This disease effects one percent of the population globally. Rheumatoid arthritis research is broad with many scientific studies underway to identify causes, cures, and preventions. Studies have determined the mechanism of the disease once it becomes established in the body, but only limited published results focus on identifying triggers and mapping the physiological responses at the onset of arthritis. It is understood that environmental factors account for seventy percent of the disease generation, while genetics accounts for the other thirty percent. Studies have shown that the immune responses to environmental factors that lead to arthritis may begin in the gut, gums, or lungs years before symptoms appear. However, the links between the timing and extent of environmental exposures on the progression of arthritis are not clearly understood. Mathematical models can provide insights into explaining the linkages between molecular level actions of chemicals and their effects on the cellular, tissue, and whole body levels of physiology in a disease. We are building a model for the chemical and biological processes that are theorized to be involved in the onset of arthritis. To model how environmental toxins, such as herbicides and bacteria, stimulate chronic inflammation, we have combined two previously published models into a more informative model. This model tracks how the concentration of tumor necrosis factor (TNF), a chemical that triggers inflammation, changes in the joints.

# BRIDGE TO THE DOCTORATE ORAL PRESENTATION ABSTRACTS

**Room 348B**
**2:00-2:15**

**Ana M. Chicas-Mosier**, Christopher W. Dinges, Timothy E. Black, Jose Agosto-Rivera, Luc Belzunces, Charles I. Abramson
University of Scholar: Oklahoma State University Departments of Integrative Biology, Stillwater OK USA
Research Conducted in Various Locations including: Tekirdag, Turkey; San Juan, PR USA; Stillwater, OK USA; and Alpes-Côte d'Azur, Provence France
Funding: National Science Foundation Partnerships for International Research Experiences, National Science Foundation Graduate Research Fellowship Program, and Oklahoma Louis Stokes Alliance for Minority Participation Bridge to the Doctorate Program
Graduate Advisor: Charles I. Abramson
Aluminum Exposure in Honey Bees: Effects on Forage, Acetylcholine, and Lifespan
Platform Preferred

Aluminum is increasingly globally bioavailable with acidification from warming and poor mining practices. This bioavailability has been shown to increase uptake by flora that can then be dispersed through products such as fruit, pollen, and nectar. Concentrations of aluminum in fruit and pollen in North America have been reported between 0.05 and 670mg/L. This is particularly concerning for pollinators that ingest pollen and nectar. Honey bees represent a globally present species experiencing decline in Europe and North America that have been shown to have hive-wide bioaccumulation of aluminum and no taste aversion to the metal. This presentation focuses on the free-flight and captive responses of honey bees to aluminum exposure. Using free-flight experiments such as artificial flower patches and floral nectary analogs we have determined how choice and flight times vary after exposure. Additionally, captive experiments have shown that circadian rhythmicity is unstable, bees are hyperactive, and that exposure can decrease lifespan. These data has been corroborated by bee-head acetylcholinesterase concentrations and suggest a hormetic tendency of the metal. The severity of these responses are tied to subspecies but effects have occurred across *Apis mellifera.* We conclude that aluminum exposure from floral products is likely a limiting factor to pollinator health and may contribute.

**Room 348B**
**2:20-2:35**

**DETECTION OF PRESCRIPTION AND ILLICIT DRUGS AT SPECIAL EVENTS**

Author: **Zachary D. Ridge**
University of Scholar: Oklahoma State University, Stillwater, OK, USA
Location of Research: Oklahoma State University Center for Health Sciences, Tulsa, OK, USA

Funding: National Science Foundation (NSF) through OKLSAMP
Mentor: Dr. Jarrad Wagner, Oklahoma State University Center for Health Sciences

This study is focused on the development and validation of an analytical method for the simultaneous detection of 57 prescription and illicit drugs in waste water. This method utilizes solid-phase extraction (SPE) and the analysis is performed with liquid chromatography coupled with tandem mass spectrometry (LC-MS/MS). The compounds of interest were selected from various classes of pharmaceuticals including muscle relaxants, opiates/opioids, benzodiazepines and illicit drugs including cocaine, amphetamines, cannabinoids, and their metabolites. Waste water samples were collected from the University of Florida (Gainesville, FL) during home football game weekends. The method used in this study could provide epidemiological insight into prescription and illicit drug use at such events to public health and safety entities currently battling widespread misuse of drugs that result in overdose and death. Expansion of these techniques to a specific region or state will support environmental monitoring and removal of drugs from waste water.

**Room 348B**
**2:40-3:55**

**CHARACTERIZATION OF THE NITROGEN ASSIMILATION REGULATOR (*gln*G) ROLE IN *ESCHERICHIA COLI* COLONIZATION OF THE MAMMALIAN INTESTINES**

Author(s): **Justin Bowen**, Jerreme Jackson, Tyrrell Conway
University of Scholar: Oklahoma State University, Stillwater, OK, USA
Location of Research: Oklahoma State University, Stillwater, OK, USA

Funding: National Science Foundation (NSF) and OK-LSAMP
Mentor(s): Tyrrell Conway, Oklahoma State University

Nitrogen, often in the form of ammonia, is used by bacteria to generate amino acids. The *glnG* gene in *Escherichia coli* codes for the nitrogen assimilation regulator protein, NR1, which activates the genes responsible for survival during ammonia limitation. Under nitrogen-limited growth conditions NR1 activates transcription of glutamine synthetase which, along with additional proteins, facilitates transport and degradation of nitrogen-containing compounds. While the *E. coli* transcriptional response to nitrogen starvation in vitro has been studied extensively, nitrogen starvation during *E. coli* colonization of the mammalian intestine has received little attention. In this study, we will use a *glnG* knockout (D*gln*G) mutant to study the role of nitrogen metabolism in MG1655 colonization of the mouse intestine. Total RNA from MG1655 recovered from the mucosal lining of the mouse intestine will be prepared and sequenced by differential RNA-seq analysis, which will allow mapping of all *gln*G-dependent promoters. We expect the *glnG* mutant *E. coli* to fail to colonize the intestines if the *glnG* gene is vital to colonization of the mammalian intestine.

# POSTER PRESENTATIONS

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# POSTER PRESENTATION ABSTRACTS

## P01

**OVEREXPRESSION OF HYDROPHOBINS IN THE FUNGAL CELL FACTORY *ASPERGILLUS NIDULANS***

Authors: **Caleb Alexander**, Jorge Lightfoot, Rolf Prade Ph.D.
University of Scholar: Oklahoma State University, Stillwater, OK, USA
Location of Research: Oklahoma State University, Stillwater, OK, USA
Funding: The National Science Foundation, OK-LSAMP
Mentor: Dr. Rolf Prade, Oklahoma State University

Abstract: Hydrophobins are low mass proteins secreted by fungi. These proteins have high levels of hydrophobicity and are able to assemble spontaneously into amphipathic amyloid monolayers. Secreted as monomers, these small proteins self-assemble into rodlets that pack to form amphipathic monolayers at hydrophobic boundaries. The rodlets are extremely stable, which can only be solubilized with harsh acid, and can polymerize back into rodlets under appropriate conditions. Unfortunately, current methods to express hydrophobins are expensive and have very low yields. The goal for this research is to clone and express hydrophobins in Aspergillus nidulans in order to produce the proteins in workable, industrially relevant levels. *A. nidulans*, a fungal cell factory, is currently a mass producer of many industrially relevant enzymes and would be an optimal host for hydrophobin expression. We have synthesized and cloned a novel expression vector into *A. nidulans* with a single selection and resistance marker to ensure high expression levels. In the future, we plan to characterize these proteins biochemically.

## P02

Type II cytokines promote the clearance of extracellular pathogens; however, inappropriate expression or overabundant production of cytokines can lead to diseases, such as asthma and allergy. Previously, we found a link between TH2 cytokine production and the activator of the unfolded protein response, IRE1α. Inhibition of IRE1α RNase activity, via treatment of TH2 cells with the commercially available drug 4μ8c, results in reduction of type II cytokines. This has led us to become interested in other ER related genes and their role in type II cytokine regulation. We found FKBP11 mRNA to be elevated in mouse type II cytokine producing cells. FKBP11 codes for FK506 binding protein FKBP19, and members of this family have previously been implicated in T helper differentiation and effector functions via regulation of the mammalian TOR pathway. Treatment of TH2 cells with 4μ8c results in reduced FKBP11, implicating FKBP11 in the regulation of TH2 cells. Therefore, we are interested in whether knocking down or overexpressing FKBP11 effects type II cytokine production in TH2 cells. We are in the process of using lentiviruses and retroviruses to test this. This work is supported by OK-INBRE NIH P20GM103447.

**P03**

**EXPLORING NOVEL NUCLEAR FACTOR MEDIATED LIGHT SIGNALING PATHWAYS USING FORWARD GENETIC SCREENING**

Authors: **Esmeralda Alcala,** Swadhin Swain, Ben F. Holt III
University of Scholar: University of Oklahoma, Norman, OK, USA
Location of Research: University of Oklahoma, Norman, OK, USA
Funding: LSAMP
Mentor(s): Swadhin Swain, Ben F. Holt III, University of Oklahoma

Ambient light greatly impacts plant development. The key mechanism of light signal perception is transcriptional control of downstream genes. Multiple transcription factors (e.g., HY5, HFR1, and LAF1) are involved in this signaling pathway. Mutations in these genes cause light perception defect (e.g., elongated hypocotyls). However, higher order mutant of all these factors has significantly less light perception defect than a photoreceptor (e.g. phyA) under corresponding light conditions. This suggests additional unknown transcription factors are controlling light perception. The heterotrimeric transcription factor NUCLEAR FACTOR Y (NF-Y) has recently been found to have a role in light signaling. Specifically, a triple mutant of NF-YC subunits, nf-yc3 nf-yc4 nf-yc9, has demonstrated light perception defects that are synergistically enhanced when combined with a mutation in the well-known light regulator HY5. The data is consistent with NF-Y operating in a separate light perception pathway from HY5. Taking advantage of the nf-yc3 nf-yc4 nf-yc9 hy5 long hypocotyl phenotype, a suppressor/ enhancer screen using Ethyl methanesulfonate (EMS)-mutagenized seeds was performed on Arabidopsis thaliana to seek new players in NF-Y or HY5 signaling. The initial screening of 60 M2 lots has identified 10 suppressors and 14 enhancer lines. The ongoing phenotypic reconfirmation of these lines in the M3 generation followed by next generation sequencing of backcrossed F2 population will be used to identify causative mutations. Further exploration of the molecular and biochemical function of identified genes, as well as their relationship with NF-Y, will lead to a more complete understanding of the light signaling pathway in plants.

**P04**

**PLANT EXTRACTS AND THEIR EFFECT ON T-CELL ACTIVATION DURING MODEL MICROGRAVITY**

Author: Kaci Craft
University of Scholar: Langston University
Location of Research: Langston, Oklahoma, USA
Funding: NASA Minority University Research and Education Program
Mentor(s): Cari Quick Campbell, Sohita Ojha, PhD, Byron Quinn, PhD

In space, environmental stresses such as reduced gravity can compromise the health of astronauts and cause immune dysregulation. During short term space flight missions', latent viruses such as chicken pox and herpes are being reactivated in astronauts. Plants such as *Sambucus canadensis* (black elderberry), *Ananas comusus* (pineapple), *Prunus persica* (peach), *Spinacia oleracea* (spinach), *Solanum lycopersicum* (tomato), *Solanum melongena* (eggplant) will be used in experiments to determine if natural compounds from these organisms will stimulate the immune system by activating T-Cells in modeled microgravity conditions. To determine T-cell activation, Peripheral Blood Mononuclear Cells (PBMC) were isolated using Ficoll Treatment, plant extracts were prepared using 50% ethanol as a solvent, T-Cells were isolated using phytohemagglutinin and the prepared plant extracts, and activation was analyzed using Flow Cytometry. After testing the plant extracts, of the six plants, pineapple showed the highest T-Cell activation. In conclusion, pineapple extract may be a possible candidate as a countermeasure against immune dysregulation.

## P05 COMMUNITY ANALYSIS OF METHANE OXIDIZING BACTERIA

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Location of Research: University of Oklahoma, Norman, OK, USA
Funding: National Science Foundation (NSF) EPSCoR Program
Mentor: Dr. Lee Krumholz, University of Oklahoma

Methane is a major heat trapping gas, accounting for nearly 10% of the greenhouse effect. Some organisms are capable of metabolizing this reduced carbon gas to its least potent form, carbon dioxide. These methane oxidizing organisms, methanotrophs, could have a significant global impact in removing methane from the atmosphere and overall lessening methane's contribution to the greenhouse effect; however, relatively little is known about the microbial communities methanotrophic organisms thrive in. The purpose of this project is to identify methanotrophs and gain a better understanding of the bacterial communities they support. This was done by analyzing 16s rDNA sequences retrieved from anaerobic organic rich methanotrophic environments using QIIME2 software. Six groups of common supporting bacteria were detected in all samples containing methanotrophic bacteria which includes: *Bacteroidales, Anaerolineae OPB11, Clostridiales, Myxococcales, Treponema, and TSCOR003-O20 of the Fibrobacteres* phyla. The metabolisms of these common organisms may play an important role in promoting methanotrophic bacteria in both freshwater and extremophilic anaerobic sediment environments.

## P06 DEVELOPMENT OF A MICROFLUDIC IMMUNOLOGICAL ASSAY FOR THE DETECTION AND IDENTIFICATION OF STAPHYLOCCOUS AUREUS ENTEROTOXIN IN FOOD SAMPLES

Author(s): Mary Tappert, Robert Brennan, and **HOPE OGBEIDE**
Location of Scholar: University of Central Oklahoma, Edmond, OK, USA
Funding: OKLSAMP
Mentor: Dr. Mary Tappert, University of Central Oklahoma

This study describes the development and testing of a microfluidic immunological assay that combines lateral flow assay and microfluidic paper-based analytical device designs for the purpose of detecting and identifying enterotoxins from *Staphylococcus aureus* in contaminated foodstuffs. Initial design research was done using BSA and anti-BSA to mimic the actual target antibody/antigens. The final assay design will use culture supernatant from enterotoxin-producing *S. aureus* as antigen and commercially produced antibodies, with antigen-antibody binding detected by a fluorophore- or gold nanoparticle-labeled secondary antibody. We described the stepwise optimization of antigen binding, antibody flow, and complex detection in a microfluidic system.

## P07 CHARACTERIZING EARLY DEVELOPMENTAL DEFECTS IN AN AVIAN MODEL OF MATERNAL PKU

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Funding: The Oklahoma Louis Stokes Alliance for Minority Participation (OK-LSAMP), National

Science Foundation (NSF), The Oklahoma IDeA Network of Biomedical Research Excellence (OK-INBRE)
Mentor(s): Dr. Nikki Seagraves, University of Central Oklahoma

Maternal phenylketonuria [MPKU] is a syndrome of multiple congenital anomalies including cardiovascular malformations [CVMs], brain and growth restriction when a mother with Phenylketonuria [PKU] does not control her dietary intake of Phenylalanine [Phe]. In this study, we aim to establish and characterize an avian model of MPKU. We focused on early developmental defects. METHODS: We investigated the effect of 2500μM Phe exposure by in-ovo yolk injection. Following the injection, the embryos underwent further development for 48 hours until dissection was performed. At HH14-17, India ink was injected into the yolk as a contrast dye. Images were taken of embryos and they were scored based on Drake et. al (2006.) RESULTS: Embryos exposed to high Phe displayed gross morphological changes including developmental and growth delays, anterior and posterior abnormalities, and torsion defects. FUTURE STUDIES: Histological analysis is underway to determine changes in heart development. Currently there is no data interrogating the mechanism by which Phe causes heart defects. We plan to utilize this model to define the mechanism of Phe cardiac teratogenicity which is critical for improving MPKU treatments and outcomes.

## P08 LYSOSOMAL PROTEINS HAVE ANTIFUNGAL ACTIVITY AGAINST THE FUNGAL PATHOGEN *CRYPTOCOCCUS NEOFORMANS*

Authors: Sierra Posey, Dr. Karen Wozniak
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Location of Research: Oklahoma State University Stillwater, Oklahoma,USA
Mentor: Dr. Karen Wozniak, Oklahoma State University
Funding: OK-LSAMP

*Cryptococcus neoformans* is an opportunistic, airborne pathogen that causes disease in mainly immune compromised individuals. People who are most susceptible to the pathogen are those with diseases such as HIV and AIDS and those on immune suppressive drugs to prevent organ transplant rejection. Previous studies showed that dendritic cells (DCs) have antifungal activity against *C. neoformans*. In particular, the lysosomal contents from DCs kill *C. neoformans* in vitro. We have identified over 3000 proteins present in the DC lysosome by mass spectrometry. We hypothesized that these lysosomal proteins have anti-cryptococcal activity. We have started to test individual proteins to identify those with antimicrobial potential. In this study, we examined the activity of three lysosomal proteins: calmodulin, nostrin, and corinin. Results showed that calmodulin and corinin do not have significant antimicrobial affects against *C. neoformans.* However, treatment with nostrin significantly inhibited cryptococcal growth compared to *C. neoformans* grown in media alone. Future studies will test nostrin for toxicity in a mammalian cell line, and if nostrin is non-toxic, additional experiments will test nostrin as a therapy in the mouse model of pulmonary cryptococcal infection.

## P09 ALTERING CELL WALL COMPONENTS INCREASES BENEFICIAL FUNGAL COLONIZATION OF RICE ROOTS

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Funding: OKLSAMP, McNair, NSF
Mentor(s): Dr. Laura Bartley; University of Oklahoma

Cereal crops are critical for producing food, feed, fiber, and potential industrial chemicals. Arbuscular mycorrhizal fungi (AMF), a beneficial root-colonizing symbiont, increases plant nutrient and tolerance to environmental stresses. Grasses, including cereals, possess acyltransferases that decorate their cell walls with phenolic compounds like ferulic acid (FA). FA crosslinks cell wall components and increases cell wall integrity. FA crosslinks could act as a physical barrier to AMF, decreasing AMF colonization. This experiment tested this hypothesis by inoculating the rice acyltransferase mutant, AT10-D1, which has 10-60% less FA, with AMF spores of *Rhizophagus irregelius*. AMF colonization increased in pooled AT10-D1 roots relative to wild-type roots by 2-fold at 3 weeks ($p < 0.05$) and by 1.5-fold at 6 weeks ($p < 0.05$) post inoculation. Furthermore, the lateral roots that grow from the main roots and are most colonized by AMF did not exhibit a significant increase in AT10-D1 at either 3 and 6 weeks post inoculation, though increases were observed in wild-type roots. Assuming most colonization occurred on the lateral roots, the calculated ratio of AMF colonization to lateral root number for AT10-D1 increased by 2-fold at 3 weeks and 4-fold at 6 weeks relative to the wild-type. These results indicate AMF colonization in AT10-D1 may be greatly enhanced in the lateral roots due to the reduction of FA crosslinking, facilitating AMF proliferation within the roots. Cereal crops with enhanced AMF colonization might attain higher efficiency in nutrient uptake and better survive environmental stresses exacerbated by climate change.

## P10 EVALUATION OF *MICROBACTERIUM* PHAGE BIOLOGY IN OKLAHOMA SOILS

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Location of Research: University of Central Oklahoma, Edmond, OK, USA
Funding: OK-LSAMP, University of Central Oklahoma Student Transformative Learning Record (STLR), University of Central Oklahoma Office of High Impact Practices (OHIP)
Mentor(s): Dr. Paul Olson, University of Central Oklahoma

Bacteriophages are viruses that infect and replicate within bacteria. From an ecological viewpoint, bacteriophages control the relative abundance and community structure of bacteria in soils. More than 40% of all bacteria are eliminated everyday by bacteriophages, thus greatly influencing the selection of traits and rapid evolution of prokaryotic cells. However, fewer than 5% of bacteria can be cultured in laboratory settings resulting in limited understanding of phage biology from terrestrial soils. The purpose of this research project includes the isolation, enumeration, morphological and genomic characterization of soil bacteriophages from host bacteria in the genus *Microbacterium*. *Microbacterium* is a sister taxon of the genus *Mycobacterium* that includes pathogenic members that cause tuberculosis and leprosy. Renewed

interest in "*phage therapy*" (therapeutic use of lytic bacteriophages to treat pathogenic bacterial infections in humans) has recently emerged. Therefore, understanding phage biology in *Microbacterium* may provide beneficial insights towards treating pathogenic bacteria. A variety of soils have been collected in central Oklahoma and evaluated for bacteriophages. Growth media (enrichment buffer) and *Microbaterium* spp. host cells are added to collected soils and mixed for several hours. The resulting extract is centrifuged and filter sterilized with only viral particles remaining. The enumerated phages are added to fresh host cells and placed as a top agar overlay onto peptone-yeast extract agar plates. Inoculated agar plates are incubated and then surveyed for plaque (*lytic zones of clearing*) formation. Isolated bacteriophages are further purified and characterized, providing.

**P11**

**COMPARING THE QUANTITY OF EXCHANGEABLE HYDROGEN BETWEEN KERATIN-BASED STANDARDS AND STREAM DWELLING ANIMALS**

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Funding: National Science Foundation (NSF)
Mentor(s): Dr.Daniel Allen

The use of stable isotopes in animal ecology studies have increased in the recent years with focus on Protium (one proton and electron) and Deuterium (one proton, neutron, and electron and also known as Heavy Hydrogen). Deuterium can be used for tracing metabolic pathways of substances for identification.α-Keratin is a structural protein found in the hair, horns, claws, hooves, and skin of various animals. Two common α-keratin samples, Caribou Hoof Standard (CBS) and Kudu Horn Standard (KHS) are the standards in focus for this project. Using these standards in tandem can create a range in which researchers can use to compare and calculate the hydrogen isotopic composition of unknown samples. The problem is that this is used for standards and samples with the same fraction of exchangeable hydrogen. Standards and samples with different chemical compositions and arrangements could have exchangeable hydrogen fractions that vary too greatly to be paired with each other. The question is: Can keratin standards be used to determine hydrogen compositions in non-keratin samples? Not all organisms are composed of the same ratio of keratin, and some organisms use an entirely different component like chitin. If the exchangeable hydrogen of these non-keratin standard organisms are similar to that of the keratin standard, they could be compatible with future projects. The overall purpose of this project is to determine the fraction of exchangeable hydrogen in insect and fish tissues, and compare it to the fraction of exchangeable hydrogen in commercially available keratin standards.

P12

**THE ROLE OF HOST CYTOSOLIC RNA-SENSING PATHWAYS IN A *MYCOBACTERIUM AVIUM* INFECTION**

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Funding: National Science Foundation REU
Mentors: Dr. Yong Cheng and Dr. Jeffrey Schorey, University of Notre Dame

Non-tuberculosis mycobacteria (NTM) are known to cause pulmonary infections in immune-compromised individuals. While *M. avium* infection is less frequent than *M. tuberculosis* infection, its consequences are still significant and difficult to treat. Much is still unknown about the mechanism of interaction between *M. avium* and the host. Our *in vitro* work indicates that *M. avium* secretes RNA to activate the host cytosolic RIG-I/MAVS/TBK1/ IRF3 RNA-sensing pathway, ultimately leading to the production of interferon-beta (IFN-b), and implicates MAVS in inhibiting *M. avium* replication. We further examined this mechanism *in vivo* by studying the role of MAVS in the RIG-I/MAVS RNA-sensing pathway in murine models. Using both WT and *Mavs*$^{-/-}$ mice infected with *M. avium,* we measured bacterial growth by plating lung and spleen homogenates. Additionally, we analyzed the lung histopathology in the infected mice via H&E staining, and found that *Mavs*$^{-/-}$ mice exhibit greater immune cell infiltration in the lungs compared to WT mice. Finally, we examined the production of various cytokines in the serum of WT and *Mavs*$^{-/-}$ mice infected by *M. avium*, and found key cytokines that were up- or down-regulated in infected mice. Our results elucidate the role of MAVS in inhibiting the replication of *M. avium* and demonstrate the importance of the RIG-I/MAVS pathway in inducing IFN-b expression in the context of an *M. avium* infection.

P13

**THE EFFECT OF SOIL NITROGEN DEFICIENCY AND COMPETITION ON SUNFLOWER DEVELOPMENT**

Author(s): **Madison Stevens,** Dazya Crayton, Brendan Pribil, Cayden CatlinUniversity of Scholar: Oklahoma State University
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Funding: Howard Hughes Medical Institute(hhmi) and Plant BIO Ecology and Evolution Department
Mentors: Dr. Lane Greer, Dr. Linda Watson, and Tony Sabella of Oklahoma State University

Nitrogen is essential to the growth and overall development of plants, and a vital component in production of chlorophyll and many protein products. The main purpose of this study was to test if varying nitrogen levels would significantly affect sunflower growth, in conjunction with nutrient competition between sunflowers grown together. Four experimental groups receiving differing treatments: high nitrogen/competition, high nitrogen/no-competition, low nitrogen/competition, and low nitrogen/no-competition. Methods included planting one plant per pot in non-competition treatments and two plants per pot in competition treatments, nine pots for each experimental group. With 36 pots total, half were subjected to high nitrogen treatments by adding osmocote pellets. Groups of low nitrogen were not treated, serving as controls. We measured numerous variables weekly and ran statistical tests once all data was collected. Chlorophyll content was the most important data for testing our hypothesis. Nitrogen is a necessary component for the production of chlorophyll; consequently, we expected the correlation of the groups to be of a statistically significant confidence interval. Key findings from our experiment show high nitrogen groups experienced a statistically significant increase in growth compared to low nitrogen treatments. Additionally, competition plant groups had a significantly increased nitrogen uptake compared to those without competition. This

study proved important because our results aligned with previously conducted studies relating nitrogen and chlorophyll levels, further proving their relation. From our results we concluded that nitrogen and competition have a significant effect on sunflower growth.

**P14**

**PURIFICATION, AMPLIFICATION, AND SEQUENCING OF TWOMICROBACTERIOPHAGES FROM OKLAHOMA SOIL.**

Author(s): **Carina Gutierrez**
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Location of Research: University of Central Oklahoma, Edmond, OK, USA
Funding: Louis Stokes Oklahoma Alliance for Minority Participation in Science (OK-LSAMP)
Mentor(s): Dr. Hari Kotturi, Department of Biology, University of Central Oklahoma.

Bacteriophages are viruses that infect and replicate within a bacterial host cell. The soil is a good source for finding new bacteriophages. As many pathogenic bacteria are becoming resistant to many available antibiotics, there is an increasing need for isolating new bacteriophages from soil that can be used for targeting drug-resistant bacteria. My current research project further enhances our understanding of bacteriophages: Arroyo, Busephilis, and Sasian. These bacteriophages were previously isolated by students taking the Virology course at the University of Central Oklahoma. They were isolated from Oklahoma soil using *Microbacterium foliorum* as the host bacteria. This research began with the purification of each phage sample, followed by amplification to obtain purified phage lysates. Viral genomic DNA was extracted from each of the three samples. Phage genomes were characterized using restriction digest with HaeIII, NspI, and SacII. Phages Arroyo and Busephilis have been sequenced using Next-Gen sequencing technique. My results indicate that Arroyo and Busephilis are newly discovered bacteriophages from Oklahoma soil with a genome length of 42129 and 52986 bp respectively. Phage Sasian replicates through the lysogenic cycle. The results from this study expand the knowledge of bacteriophages present in Oklahoma soil.

**P15**

**CANINE AND FELINE ILLNESS IN CORRELATION TO SEASONS**

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Location of Research: Pawsitive Veterinary Care, Tulsa, OK, USA
Mentor(s): Daniel Leifield, Oklahoma State University

Many observational studies on canines and felines are often used from teaching hospitals that are not from the general public. The data from these studies do not give a good representation of the general population; therefore my goal is to see if canines and felines from the general population are more likely to bring their pets to a veterinary clinic more often during a summer month versus a winter month. I used the database from Pawsitive Veterinary Care in Tulsa, Oklahoma to retrieve data for the months of June and December from the past three years, including 2015, 2016, and 2017. Within these months, I only selected data from every Tuesday and Thursday of each month to decrease the chance of repeated visits from the same patients. The data was then divided into four separated categories including sick, vaccines, surgery, and euthanasia. From the collected data, it was found that canines and felines frequently visited the veterinary clinic more in June than December.

**P16**

Temperature variance in Thailand: The relationship with free-ranging small subtropical mammals with ambient temperature

Mentors: Dr. Michael Ceballos - University of Arkansas; Dr. Danielle Levesque – The University of Maine; Ana Breit; Levesque – The University of Maine
Undergraduates: Marly Fixico-Harrison – Oklahoma State University; Samantha Telvi-Carlo - Universidad del Este-Puerto Rico; Rosadiana Carter - American Samoa Community College; Rattanaporn Tanjai - Mahasarakham University; Manisara Kongweha - Mahasarakham University

In the face of a rapidly changing climate, the ability to make informed decisions about how certain groups (plants vs. animals) or certain communities (tropical low elevation vs. tropical high elevation) might respond to a pressing problem for organismal biologists (Janzen 1967). This study covers research from a Research Experience for Undergraduates (REU) that took place in northeastern Thailand in the summer of 2018. Primary data was collected at the Maha Sarakham University forest in Koeng, Muang Mahasarakham, Maha Sarakham. The objective of the study was to compile data in Thailand's subtropical regions where there is a minimal variation of temperature versus regions with temperate conditions. As well as look the at the small mammal population's physiological impacts in response to fluctuating temperatures. The methods included identifying the trapping location, trapped animal's food preference, the small mammals trapped, reveal the trapping site temperature and conduct respirometry tests on the captured species. With the use of iButtons and secondary temperature recordings, we were able to show a variance of temperature of the local forest. However, were unable to compare to our temperature data to the anticipated protocol sample size of 10 small mammals to make a comparative analysis of rising temperatures and small mammal responses in the subtropics.

**P17**

**Pyridine linked bis cross-bridged tetraazamacrocycles**

Author(s): **Terin L. Fletcher**, Megan A. Ayala
University of Scholar: Southwestern Oklahoma State University, Weatherford, OK, USA Location of Research: Southwestern Oklahoma State University, Weatherford, OK, USA Funding: the National Science Foundation (NSF) the National Institutes of Health (NIH) Mentor(s): Dr. Tim Hubin, Southwestern Oklahoma State University

Bis cross-bridged tetraazamacrocycles, and their transition metal complexes, have become one of the most effective classes of CXCR4 and CXCR7 chemokine receptor antagonists. These cell surface receptors are important to a number of disease states, including HIV, cardiovascular disease, and cancer. Our group has continued to produce new analogues of these compounds in an effort to improve further the efficacy, specificity, and drug-like properties of this class of compounds. In this presentation, we will describe the synthesis, chemical characterization, and biological activity of a new series of bis cross-bridged tetraazamacrocyles in which the unit linking the two macrocyclic units is a nitrogen-containing pyridine, rather than the typical all-carbon aromatic linking units of our previous compounds. Results include the apparent production of a 2+2 cyclic version of our typical ligands apparently driven by the change to the pyridine linker.

P18

**ETHYLENE CROSS-BRIDGED TETRAAZAMACROCYCLES WITH THIOL PENDANT ARMS**

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Location of Research: Southwestern Oklahoma State University, Weatherford, OK, USA
Funding: the National Science Foundation (NSF) the National Institutes of Health (NIH)
Mentor(s): Dr. Tim Hubin, Southwestern Oklahoma State University

Cross-bridged tetraazamacrocycles have made important contributions as ligands that strongly bind transition metal ions. This property is very useful when the metal complex is intended for use under harsh conditions. Applications that have benefited from such complexes are: oxidation catalysis, medical imaging, and protein-binding drug molecules. Pendant arms can be added to the cross-bridged tetraazamacrocycle to modify the coordination geometry and the chemical properties of the resulting metal complex. Previous pendant arms utilized have included pyridine, amide, carboxylic acid, phenol, and amines. In this project, we have developed the synthesis, by two different paths, of pendant arm thiol derivatives of the well-known cross-bridged cyclam and cyclen ligands.

P19

**Name:** Patricia Bazile

**Abstract:** During spaceflight it has been found that astronaut T-Cells have been losing their memory due to microgravity conditions. T-Cells are a type of white blood cell found in the immune system. Due to immune dysregulation T-Cells go into a state of immunosuppression. This creates health risk such as bone loss, different infections such as yeast infections in women, and the reactivation of latent herpesviruses and chickenpox. We hypothesize by using different natural plant compounds, immunosuppression due to microgravity may decrease during spaceflight. Extracts were obtained using 50% ethanol and using these six plants; Cucurbita pepo (Mexican squash), Actinidia deliciosa (Kiwi), Apium graveolens (Celery), Astragalus membranaceus (Astragalus root), Agaricus bisporus (Mushroom), and Manihot esculenta (Yucca root). We combined three plant extracts with T-Cells using the mitogen Anti CD3CD28 and incubated them in static conditions which simulates earth's gravity, and in clinostat conditions which simulates microgravity. We then used a flow cytometer to analyze T-Cell activation. In conclusion mushroom had the highest levels of activation in the simulated microgravity conditions compared to our controls and other plant extracts. Future work will consist of running extracts at a higher concentration and evaluating the active ingredient in the extract by using liquid chromatography mass spectrophotometry (LCMS) in hopes that it will become a useful countermeasure against immunosuppression in astronauts due to microgravity.

**Discipline:** Immunology
**Classification:** Sophomore

**P20**

**ISOLATION OF AZOREDUCTASE GENE & BIOTRANSFORMATION OF AZO DYES BY *NEISSERIA SICCA***

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Funding: Kansas IDeA Network of Biomedical Research Experience (K-INBRE)
Mentor: K.J. Abraham, Langston University

Azo dyes are artificial dyes that are used in the textile and food industry. These dyes are resistant to degradation due to their azo group(s). When azo dyes are disposed of in the environment, they produce carcinogens that pose a threat to humans and other organisms. Some strains of bacteria found in the human flora have been found to degrade these azo dyes. The objective of this experiment is to determine and test the hypothesis that *Neisseria sicca* will degrade various azo dyes. The bioassay experiment was tested on the dyes Direct Blue, Metanil Yellow and Acid Red for 7 days. These techniques resulted in a significant color reduction of Metanil Yellow. In conclusion, this study confirms the hypothesis and further confirms previous research that certain bacteria must possess a component that enables it to degrade azo dyes.

**P21**

Identifying New EGFR Driver Mutations in Non-Small Cell Lung Cancer

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Lung cancer is the leading cause of cancer deaths worldwide, with a 5-year survival rate of 18%. Non-Small Cell Lung Cancer (NSCLC) represents the major histological sub-type making up 85% of all lung cancers. One oncogenic driver of NSCLC is EGFR, which is mutated in 14% of patients. Currently, a subset of EGFR mutations remains functionally uncharacterized. In this study, we sought to functionally characterize all possible EGFR mutations. To systematically assess uncharacterized mutations in EGFR, we performed a saturation mutagenesis screen, where we identified both known EGFR hotspot mutations (EGFR L858R) and potential novel EGFR driver mutations. From our screening efforts we identified EGFR I759M as a potential novel driver of EGFR oncogenesis. To validate this finding, we expressed EGFR I759M in H3122, a NSCLC cell line, and performed a population doubling assay and a cell viability assay. We also evaluated EGFR I759M protein expression using western blot analysis. Together, our preliminary findings suggest that the EGFR I759M mutation is a likely driver of EGFR oncogenesis.

**P22**

**Name:**Tajinee Porter

**Abstract:** Scientists have found that astronauts' lymphocytes lose their memory in the short duration space flight missions. Lymphocyte memory loss leads to latent virus reactivation. It is hypothesized that microgravity is the cause of immune dysregulation, during space flight conditions. To identify possible countermeasures against immune dysregulation, we started looking at organic plant extracts. We hypothesize that T-cells treated with immunity enhancing plants will retain their memory under microgravity conditions. To test the hypothesis, extracts were made from *Citrus limon* (lemon), *Pisum sativum* (peas), *Daucus carota* (carrot), *Prunus domestica* (plums), *Solanum tuberosum* (potato), and *Pyrus* (pear). Freshly isolated lymphocytes were incubated for 24h in microgravity conditions, that were treated with mitogen anti CD3/CD28 and selected plant extracts. After 18-24 h of incubation, expression of CD69 & CD25 (cell surface markers for activation) was detected using flow cytometry. Results showed that *Pisum sativum* (pea) extract displayed the highest activation during modeled spaceflight conditions compared to the other plant extracts tested. Further experiments are required to identify the chemical component/s countering the microgravity conditions.

**Discipline:** Immunology

**Classification:** Sophomore

**P23**

**SYNTHESIS OF $CSPBI_3$ QUANTUM DOTS FOR OPTOELECTRONIC APPLICATIONS**

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Funding: The National Science Foundation (NSF)

Mentor: Dr. Do Young Kim, Oklahoma State University - Tulsa

**P24**

The Rare Earth Elements (REEs) include the lanthanide elements, Ytrium, and Scandium. Due to their special properties, they are very valuable in the market for technology and military applications. In North Dakota lignite coals, it has been determined there is a high amount of REE content (Technology that integrates extraction of rare earth elements and upgrading lignite coals proves to be a viable option. This project focuses on analyzing the organic and inorganic associations of the REEs in coal so we can improve the productivity of extraction and see when the process is economically viable.

**P25**

**HYDROLOGIC AND SEDIMENT YIELD MODELING OF NATIVE PRAIRIE AND ENCROACHED EASTERN REDCEDAR WATERSHEDS**

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**Location of Research**: Oklahoma State University, Stillwater OK, USA

**Funding**: The United States Department of Agriculture National Institute of Food and Agriculture (Grant Number 2013-05799-1001450), the Oklahoma-Louis Stokes Alliance for Minority Participation Bridge to Doctorate Fellowship (Grant Number HRD 1408748), and the National Science Foundation

Eastern redcedar represents a modern-day challenge to Oklahoma as it has encroached over eight million acres of land since 2002 and shown to impact water balances and alter soil characteristics. Eastern redcedar can drastically reduce soil moisture content due to its extensive root system and damage native biomes in the process. Currently, efforts to reduce eastern redcedar encroachment have been unsuccessful; however, studies have shown eastern redcedar biomass to be a potential ethanol feedstock for the state. The purpose of this study is to compare the observed changes in watershed sediment yield and runoff caused by varying vegetation types, and evaluate the feasibly of converting encroached eastern redcedar rangeland to cultivated switchgrass. More specifically, this study monitors surface runoff and sediment yield of seven small watersheds within the Cross-Timber Experimental Range (CTER) during surface runoff events under encroached eastern redcedar, harvested eastern redcedar, cultivated switchgrass, and native prairie vegetation. Preliminary analysis shows that sediment yield concentrations from encroached eastern redcedar watersheds were larger compared to native prairie watersheds. However, due to their smaller runoff volume, total sediment yield of encroached eastern redcedar was less than native prairie vegetation. Additionally, the native prairie watersheds also exhibited more surface runoff events and larger runoff volume compared to encroached eastern redcedar watersheds. After harvest, however, previously encroached watersheds initially.

**P26**

Cosmic Rays and Detecting Them

My research task over summer 2018 was to design and fabricate a cosmic ray telescope. A cosmic ray telescope is a device that detects and tracks the paths of muons, fundamental particles that are essentially heavy, more energetic electrons, that come from long dead stars far away from Earth. The purpose of this project was to build a device to test the power source that OSU is building for the ATLAS detector at CERN. In about seven years, ATLAS will go through a massive upgrade to its muon detectors. The detector will move from using strip and pixel modules to detect muons to using only pixel detecting modules, which are more accurate. ATLAS will also move from powering all of its detecting modules in parallel to powering them in serial, which is more efficient and will remove a significant amount of dead material from the detector. OSU has been tasked with designing and fabricating a new power source that can power the pixel detector chips in series at the same efficiency as powering them in parallel. The purpose of building a cosmic telescope was to test the efficiency of the power source with real world conditions. Although OSU does not have an accelerator, nature acts as one for muons, so cosmic rays can be used to simulate muons passing through the pixel detecting chips. As of September 2018, the cosmic ray telescope is not built because we lack the materials to fabricate it. We do not have the correct size scintillators, nor do the chips run in series without dropping subscription. We do, however, have a cosmic ray detector, which counts muons, but does not track their paths. There are some major hurdles to be overcome with this project, but we are working to overcome.

**P27**

**AUTOMATED DETECTION OF BIRD ROOSTS USING NEXRAD RADAR DATA AND ARTIFICIAL NEURAL NETWORKS**

Author(s): **Katherine Avery**, Carmen Chilson, Amy McGovern, Eli Bridge, Daniel Sheldon, Jeffrey Kelly
University of Scholar: University of Oklahoma, Norman, OK, USA
Location of Research: University of Oklahoma, Norman, OK, USA
Funding: NSF-DGE-1545261 Grant
Mentor(s): Amy McGovern, University of Oklahoma

Artificial neural networks (ANNs) are an effective tool for automatically locating bird roosts using radar. NEXt generation weather RADars (NEXRAD) are designed to collect data on weather, but they also pick up information on moving, airborne objects, including birds. NEXRAD helps aeroecologists to detect the location of bird roosts, but this data is tedious to process manually. Therefore, ANNs are used to detect the roosts automatically from NEXRAD images of purple martin and tree swallow roosts in the eastern United States. Four types of radar field images, including reflectivity, velocity, $\rho_{HV}$, and $Z_{DR}$, were determined to be useful for finding roosts. The ANN achieves an accuracy, true positive rate, and true negative rate of around 80 percent each, showing that this method has potential as a tool for roost detection. Convolutional neural networks (CNNs), a type of ANN, were found to perform better than the traditional ANNs, achieving an accuracy, true positive rate, and true negative rate of over 90 percent each.

**P28**

**QUANTIFICATION OF FLAGELUM-DRIVEN CELL MOTELLITY**

Author(s): **Joseph Wagner**
University of Scholar: University of Central Oklahoma, Edmond, OK, USA
Location of Research: University of Central Oklahoma, Edmond, OK, USA
Funding: OK-LSAMP and STLR
Mentor(s): Dr. Gang Xu, University of Central Oklahoma

Flagella and cilia are slender subcellular organelles that play a vital role in the development and health of various organisms from algae to mammals. As a complex molecular beam in structure, flagella and cilia are driven by motor proteins to beat actively to propel cells or move materials. Cilia-related dysfunctions can result in severe disorders, such as primary ciliary dyskinesia and severe asthma. In this project, we used the biflagellate green algae *Chlamydomonas* as the model to study the biomechanical functions of flagella, i.e. flagella-driven cell motility. In order to do so, we recorded and tracked the bulk diffusive behavior of these cells in culture medium with a high-speed digital camera under the microscope. We then quantified the effective diffusion coefficient of the cells that are either devoid of or driven by developed flagella. Our results showed that the flagella provided normal algal cells with high motility compared with those cells without flagella. With the developed experimental platform and procedures, we will quantify the flagella-driven cell motility in medium of various viscosity to understand the effects of physical resistance on the development and functions of the flagella.

**P29**

**LINKING WITHIN-HOST AND BETWEEN-HOST HIV DYNAMICS**

Author(s): Aidan Backus, Angelica Bloomquist, J M. Maxwell, Elyssa Sliheet, Yuanming Tang, **Carlos Villanueva**
University of Scholar: University of Oklahoma
Location of Research: San Diego State University, San Diego, CA, USA
Funding: National Science Foundation (NSF) and OK-LSAMP
Mentor(s): Dr. Naveen Vaidya, San Diego State University

Lack of HIV vaccines have made therapy essential to the reduction of HIV transmission and control of epidemics. For the implementation of control strategies, it is critical to understand between-host transmission dynamics involving proper risk of infection, which depends on the within-host HIV dynamics of the source. In this study we develop mathematical models linking within-host and between-host HIV dynamics. In particular, we incorporate antibody response into within-host viral dynamics models to estimate the probability of transmission from an infected individual to an uninfected individual. Our models predict that this probability is largely dependent on the source's disease status, including viral load and antibody profile. Using the probability of infection resulting from within-host models, we then develop models to describe the dynamics of between-host transmission, which is consistent with HIV prevalence data from South Africa. With these models, we evaluate how within-host disease status of infected individuals influences the between-host spread of HIV within communities.

**P30**

**BIS CROSS-BRIDGED TETRAAZAMACROCYCLES WITH THIOL AND AMINE PENDANT ARMS FOR BIOMOLECULE CONJUGATION**

Author(s): **A. James Nimsey**
University of Scholar: Southwestern Oklahoma State University, Weatherford, OK, USA
Location of Research: Southwestern Oklahoma State University, Weatherford, OK, USA
Funding: the National Science Foundation (NSF) the National Institutes of Health (NIH)
Mentor(s): Dr. Tim Hubin, Southwestern Oklahoma State University

Bis cross-bridged tetraazamacrocycles, and their transition metal complexes, have become one of the most effective classes of CXCR4 and CXCR7 chemokine receptor antagonists. These cell surface receptors are important to a number of disease states, including HIV, cardiovascular disease, and cancer. Our group has continued to produce new analogues of these compounds in an effort to improve further the efficacy, specificity, and drug-like properties of this class of compounds. In this presentation, we will describe the synthesis, chemical characterization, and biological activity of a new series of bis cross-bridged tetraazamacrocyles in which the bis macrocycle is appended with either a thiol or primary amine pendant arm. These pendant arms are intended to allow conjugation to biologically active compounds, or biomolecules such as proteins and nucleic acids themselves. Once conjugated, the bis cross-bridged tetraazamacrocycle unit would serve as the targeting unit which would bind specifically to cells expressing high concentrations of CXCR4 or CXCR7 on their surfaces, such as certain cancer cells. The conjugated protein or nucleic acid could then various therapeutic, imaging, or catalytic roles. Synthetic and characterization methods and results for these novel compounds will be presented.

P31

**UNRAVELING THUNDER OUTCOMES**

Author: **Chris Cordova**
University of Scholar: University of Central Oklahoma
Location of Research: Oklahoma City, Oklahoma
Funding: OK-LSAMP
Mentor: Dr. Cynthia Murray, University of Central Oklahoma

This study investigated whether there are patterns in Thunder basketball games with regard to wins and losses. Data for the Thunder and their respective opponent per game (n=82) was obtained from https://stats.nba.com/scores/ and https://basketball.realgm.com/nba/teams/Oklahoma-City-Thunder/33/Schedule/2017 for 2016-2017. Specific variables included: points scored, field goals made/attempted, 3-point shots made/attempted, free throws made/attempted, rebounds offensive/ defensive, assists, turnovers, steals, blocks, and personal fouls. Longitudinal graphs were done for Thunder–Opponents scores, type of offensive scoring, and type of defense (number of rebounds, steals, and blocks). Statistical methods included t-tests, Pearson correlation coefficients, logistic regression, and multiple regression. With regard to wins/losses, there were significant differences ($p<0.05$) between the average point difference, the average 2-point field goal percentages, the average 3-point shot percentages, the average number of defensive rebounds, and the average number of assists.

P32

Title: Effect of Media Perfusion on APAP Metabolism of HepG2 cells

Authors: Christen A Parmley, Carrie L German, Sundar V Madihally.

There is a need for a faster drug screening process to make medicine available to the public. Development of three dimensional liver tissue that mimics normal liver function will help observe cellular behavior to a drug outside the body. Designing such *in vitro* 3D liver tissue also helps in high throughput screening of drug candidates for hepatotoxicity. In this regard, we have adapted chitosan-gelatin porous structures to culture hepatocytes in 3D configuration and tested the metabolism of acetaminophen (APAP) by HepG2 and HepaRG cells. These are static cultures. Since there is continuous perfusion through liver, we questioned how fluid flow affects the metabolism of APAP in HepG2 cells. In order to convert the static culture to fluid flow, we built an axial flow bioreactor housing 3D scaffold of same dimension as static culture. HepG2 cells were cultured on CG scaffolds (prepared by freeze drying) for five days, prior to placing in the bioreactor. Flow-loop for bioreactor operation was similar to prior publication [1]. In brief, a small-size bioreactor was constructed in house and connected to a culture medium reservoir, which passed through a water bath maintained at 37 °C. Using a Masterflex L/S pump, medium was circulated at 1.3mL/minute through the bioreactor filled with medium. Medium also contained 1 mM APAP. Samples were collected every six hours over a 24 hour period. In tandem, static culture experiments were also performed.

**ACKNOWLEDGEMENT:** CAP received OK-LSAMP scholarship. We thank Oklahoma Center for Advancement of Science and Technology (HR15-142) for funding.

[1] Podichetty JT, Bhasker PR, Singarapu K, Madihally SV. Multiple Approaches to Predicting Oxygen and Glucose Consumptions by HepG2 Cells on Porous Scaffolds in an Axial-Flow Bioreactor. Biotechnology/Biongineering.112 (2), 393-404. 2015.

**P33**

**ABSTRACT**

Investigation of Microwave and Ultrasonic Energy in the Synthesis of Heterocycles Related to Medicinal Chemistry. Restituto Paris III**,** Stephen Myers, and E. Ann Nalley, Department of Chemistry, Physics, and Engineering, Cameron University, Lawton, OK 73505.

Allowing many chemical reactions to be completed within minutes, microwave heating and ultrasonic energy have revolutionized preparative chemistry. Both are green technologies and as a result, are becoming widely adopted in both academic and industrial laboratories. This is especially true for microwave synthesis but not many applications of ultrasonic energy in organic synthesis have been reported. Heterocycles are very important functional groups especially in medicinal chemistry. Not only are they pivotal in the synthesis of drugs but also form part of the structure of a diversity of drugs, vitamins, natural products and biomolecules. In this poster we will present the results of syntheses of imidazoles and azolines by both microwave and ultrasonic energy. Derivatives of these two classes of compounds are known for analgesic, antifungal, antihypertensive, antiobesity, anticancer and other biological activity.

**P34**

**RESEARCH INTO AMAZON ALEXA OTHER HOME ASSISTANTS**

Author: **Landon Manning**
University of Scholar: University of Tulsa, Tulsa, Oklahoma, USA
Location of Research: University of Tulsa, Tulsa, Oklahoma, USA
Funding: OK-LSAMP, TURC
Mentor: J.C. Diaz, University of Tulsa

The emergence of several mainstream home and office assistants, such as Amazon's Alexa, lead to this research producing an all-in-one "Smart Mirror" home and office assistant. Research into custom Amazon Alexa skills was done to understand the fundamentals of how the voice assistants worked. The goal was to use this understanding to build a custom and more diverse home and office assistant. This was achieved by utilizing a Raspberry Pi 3 as the central computer, with Raspbian as the OS. Using the freely-provided API keys from Google and Amazon allowed a configuration of a two-in-one Google Home and Amazon Alexa voice assistant as a background process. Combining this with the open source "MagicMirror$^2$" software produced a visual interface, which is enhanced with the interface connected to the user's Google account from the Google Home voice assistant process. The Smart Mirror has all of the Google Home and Amazon Alexa voice assistant capabilities, along with a Google -connected visual interface to show weather, a user's Google Calendar, news, quotes, trivia games, and more. For the same price as an Echo Plus, this research produced an audibly and visually integrated home and office assistant with much greater utility and merit, and it shows that anyone can build the same thing as substitute for the mainstream products.

**P35**

**ANNUAL SALE GAMING ANALYSIS: PUBLIC DATA MODELING FOR USER FORECASTING**

Author(s): **Scott Wilson** and Dr. KM. George
University of Scholar: Cameron University, Lawton, OK, USA
Location of Research: Oklahoma State University, Stillwater, OK, USA
Funding: the National Science Foundation (NSF)
Mentor: Dr. KM. George, Oklahoma State University

This project was carried out to determine potential user relationships between the massively popular "Steam Summer Sale" and the social media site Twitter. With such a plethora of data open to the public, Big Data research provides valuable information to companies by forecasting events, determining overall sentiment, and much more. In this project, Twitter data, gathered using a flume agent, was filtered using keywords then cleansed using Python to remove spam. Steam user data, acquired from a third-party site, was arranged by day and local minima/maxima for model preferences. Two models were then used on the data using Matlab. Granger Causality to determine relationship between users and tweets per day, and Hidden-Markov to explore forecasting capabilities. This project was carried out during the Big Data Analytics REU at Oklahoma State University over summer 2018 and will hopefully be continued in summer 2019 in time for the next Summer Sale.

**P36**

**LIPID EXTRACTION OF ALGAE THROUGH MEMBRANE SEPARATION**

Author(s): **Alexandra Lopez** and Dr. Colin Beal
University of Scholar: Oklahoma State University, Stillwater, OK, USA
Location of Research: Glencoe, OK, USA
Funding: Department of Energy (DOE) and OK-LSAMP
Mentor(s): Dr. Colin Beal, B&D Engineering and Consulting LLC

Because algae can contain up to 40% of their weight in oil, it is an excellent candidate for biofuels. Duke University is leading a project on the production of fuel and feed from microalgae sponsored by the Department of Energy (DOE) and titled Marine Algae Industrialization Consortium (MAGIC). Duke University grows and ships the algae, the subcontractor, B&D Engineering and Consulting LLC, extracts the lipids with a membrane, and the post-extracted algae is then sent to Cornell University and Nord University for animal feed trials. This research focuses on the extraction of lipids. Three large-scale extractions have been completed as of October 2018. The objective of this research is to develop a method to extract lipids from microalgae using a membrane without the use of a solvent. The lipids can then be refined into fuel and used to combat climate change, respond to higher energy consumption, and secure energy supply.

**P37**

**COUNTERFACTUALS IN A MULTIAGENT DOMAIN**

Author(s): **Alexandra Bejarano**, Connor Yates, and Golden Rockefeller
University of Scholar: University of Tulsa
Location of Research: Oregon State University, Corvallis, Oregon, US
Funding: National Science Foundation (NSF)
Mentor: Dr. Kagan Tumer, Oregon State University

In domains such as space exploration, providing agents explicit instructions on how to complete tasks is difficult because of the lack of complete information about the domain. Instead, agents need to learn how to complete tasks through interactions with their environment. In addition, the domain being tightly coupled (where coordination between agents is necessary to maximize the overall system performance) can complicate an agent's learning. An agent, in addition to learning from its interaction with the world, now needs to consider the actions of other learning agents. The key problem then lies in finding the most effective way to promote coordination among agents. Counterfactuals, which are distinct hypothetical changes, help agents learn the correct joint actions and enhance the team's overall performance. Extending the previous work and formulation of the D++ rewards function, this research investigated and tested the effectiveness of different counterfactuals within a multiagent domain.

**P38**

## STRESS RELAXATION AT THE POLYDOMAIN-MONODOMAIN TRANSITION OF LIQUID CRYSTAL ELASTOMERS

Author(s): **I. Hernandez Moreno** and A. Azoug,
University of Scholar: Oklahoma State University, Stillwater, OK, USA
Location of Research: Oklahoma State University, Stillwater, OK, USA
Funding: School of Mechanical and Aerospace Engineering
Mentor(s): Dr. Aurelie Azoug, Oklahoma State University

Liquid Crystal Elastomers (LCEs) are polymers composed of polymer chains and liquid crystals. Liquid crystals orient and disorient according to temperature, giving 'smart' properties to LCEs. LCEs are synthetized in a polydomain state, where the liquid crystals exhibit a local order but the material is globally isotropic. During the polydomain-monodomain (PM) transition, polydomain LCEs can achieve monodomain formation via mechanical stretching. In monodomain LCEs, the liquid crystals are oriented in the direction of the stretching. As LCEs are viscoelastic materials, they exhibit stress relaxation, where stress decreases at constant strain. Measuring the relaxation modulus constitutes a classic characterization of the viscoelasticity of a material.
In this study, we intend to determine how the PM transition affects the viscoelasticity of the material. We quantify the relaxation modulus of a polydomain LCE at multiple strains through the PM transition. Stress relaxation of a main-chain LCE is measured at several times, at room temperature, and at strains between 20% and 80%. The relaxation modulus is then computed from the data using Matlab. Results show that the relaxation modulus, independently of other mechanical properties, is strongly modified by the transition.

**P39**

## THE EFFECTS THAT INCLUDING CARBON NANOTUBES IN CARBON NANOFIBER YARNS HAS ON ITS MECHANICAL PROPERTIES

Author(s): **Carolyn Cruz-Turrubiartes** and Dr. Mrinal C. Saha
University of Scholar: University of Oklahoma, Norman, OK, USA
Location of Research: University of Oklahoma, Norman, OK, USA
Funding: The National Science Foundation (NSF) and OK-LSAMP
Mentor(s): Mehmet Demirtas, Dr. Mrinal C. Saha, University of Oklahoma

Carbon nanotubes (CNT) and carbon nanofibers (CNF) play a pivotal role in the advancement of nanomaterials. Their mechanical properties allow the strengthening of polymer nanofibers, and are a consequence of their unique structures. This study explores the effects that adding CNT into electrospun carbon nanofibers has on its mechanical properties. From a previous study, it was concluded that electrospun carbon nanofibers had strong mechanical properties. A solvent consisting of both CNF and CNT is produced by adding premade multi-walled carbon nanotubes (MWCNT) and mixing it into the polyacrylonitrile (PAN) and dimethylformamide (DMF) solution. This newly developed solution then undergoes the same procedures to be stirred and electrospun as the original solution went through. Electrospinning is what produces the carbon nanotube filled nanofiber yarns that are desired. These yarns will undergo the same testing methods as the original yarns to be able to effectively see the changes that were brought forth by including the CNT. Since CNT is known to have strong mechanical properties, the expected outcome from this project is that the yarns will yield even stronger mechanical properties. In addition to a positive incline in the properties, the results are expected to fluctuate accordingly depending on the concentration level of CNT that is added to each solvent that is to be tested.

**P40**

**A Comparison of Two Jet Simulation Techniques**

In the ATLAS Experiment, Monte Carlo techniques are used to simulate the data gathered by the ATLAS detector. There are various methods of computing these simulations, and the current method of simulating particle jets is known as “Full Simulation”. While Full Simulation is very accurate, it is quite slow. At the expense of accuracy, another method known as “Fast Simulation” is twenty times faster. The inaccurate nature of Fast Simulation can preclude Fast Simulation from being used in sensitive searches for new physics in ATLAS. In this study, the results of each method are compared to identify which characteristics of events are simulated inaccurately by Fast Simulation, so that they can hopefully be corrected in the future for fast and accurate jet simulation. Faster jet simulation techniques will allow many studies in the ATLAS experiment to create more Monte Carlo simulations data with less computational overhead, which cuts down on the amount of time and resources needed to run a study. The comparison of Fast Simulation and Full Simulation was done by comparing many characteristics of simulated jets from highly boosted top quarks. This data necessary for this comparison was created and analyzed using the ROOT library. The results found that Fast Simulation techniques are successful at many aspects of jets simulation, but do not accurately simulate the substructure characteristics of the jets, most importantly the number and energy of the constituent subjets.

**P41**

**Shape Memory Epoxy Based Carbon Fiber for Aerospace Applications**

Rosa Lopez, Jingyu Wang and Yingtao Liu
School of Aerospace and Mechanical Engineering, University of Oklahoma
Norman, Oklahoma 73019 USA

The shape recovery properties of shape memory epoxy based composites (SME), make them ideal for deployable aerospace structures. Shape memory materials have the ability to be deformed into a temporary shape and later recovered to the original or “memorized” shape through exposure to external or embedded stimulus such as heat, light etc. This research focused on developing a method to best synthesize shape memory epoxy based carbon fiber that can function well in rigorous environments like that of outer space. The shape memory epoxy and carbon fiber samples were fabricated using a wet lay-up process in different methods and subjected to deformation and shape recovery to understand the shape memory effect of the SME composite. The fabricated samples were then tested using a Joule-heating activation method which involves direct electrical current to observe the recovery speed and corresponding temperatures of multi-layer epoxy based carbon fiber. Observations demonstrated reliable and consistent shape recovery response to the Joule heating tests; however, consistent bending hindered the quality of the sample at areas of deformation. In order to address high levels of stress experienced at areas where deformation occurs, semi-cured SME samples were stored at freezing temperatures (4□) until ready to undergo wet-lay process and final curing process in oven which improved overall quality. High stress levels were further addressed by integrating radius indentions at areas subjected to deformation on pre pegged SME samples. This was accomplished by placing samples between 3D printed molds during the curing process. This method provided favorable results when subjected to joule heating testing. Further research can result in even greater quality of shape memory composites for the purpose.

**P42**

Abstract (Montana Minnis)

In the past couple decades, tissue engineering and cancer biology have been developing three-dimensional (3D) tumor models to study cancer progression, metastasis, and drug responsiveness. Unlike conventional cancer cell culture (cell monolayers), 3D models can mimic complex cell-cell and cell-matrix interactions found *in vivo*. In this ongoing study, I have been developing a system to culture metastatic breast cancer cells on 3D printed scaffolds in flow perfusion bioreactors. Breast cancer cells are mechanoresponsive, and flow perfusion provides a physiologically relevant stimulus to determine the effects of stress on metastatic potential. Shear stress can be modulated by changing the pore size and geometry of the scaffolds, and the long-term goal of this project is to determine the relationship between breast cancer metastasis to bone and local shear stress profiles. The first steps in this study involved the surface modification of 3D printed polylactic acid (PLA) scaffolds, and we successfully adapted methods from bone tissue engineering for cancer applications. Preliminary results are given followed by a discussion of future directions for this project.

# SPECIAL THANKS

OK-LSAMP would like to thank the ***Division of Institutional Diversity*** (ID) for continued support and connections created among the other ID programs and organizations. For the sixth year, OSU has received the Insight into Diversity Higher Education Excellence Award. Institutional Diversity also contributes to lunch at the symposium.

OK-LSAMP appreciates the use of rooms provided for the symposium by the ***Department of Biochemistry and Molecular Biology*** - Dr. John Gustafson, Department Head, and the ***Department of Entomology and Plant Pathology*** - Dr. Phil Mulder, Professor and Head.

OK-LSAMP would like to thank all the ***graduate schools*** and departments for supplying information on graduate programs and internship opportunities for our scholars.

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

OK-LSAMP is eternally grateful for the hard work and dedication of the ***OK-LSAMP Staff*** 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. Thank you to all the volunteers that made this possible.

# REGISTERED ATTENDEES

| Name | Institution | Academic Discipline |
|---|---|---|
| Alcala, Esmeralda | University of Oklahoma | Microbiology |
| Alexander, Caleb | Oklahoma State University | Microbiology |
| Allbritton, Elisabeth | Southwestern OSU | Chemistry |
| Alvarado, Juan | The University of Tulsa | Biochemistry |
| Alzahrani, Nawal | Oklahoma State University | English |
| Anderson, Briana | Langston University | Biology |
| Angle, Julie | Oklahoma State University | Science Education |
| Austin, Aaron | Oklahoma State University | Physics |
| Avery, Katherine | University of Oklahoma | Computer Science |
| Bailey, Romain | Oklahoma State University | Aerospace Engineering |
| Bales, Charles | The University of Tulsa | Electrical Engineering |
| Barber, Dylan | East Central University | Theoretical Physics/ Celestial Mechanics |
| Bazile, Patricia | Langston University | Biology |
| Bejarano, Alexandra | The University of Tulsa | Computer Science |
| Bernal, Jonathan | Oklahoma State University | Fire Protection/Safety Engr Technology |
| Berryhill, Jereme | Northeastern State University | Chemistry |
| Beyer, Ean | University of Oklahoma | Biomedical Engineering |
| Bikkina, Prem | Oklahoma State University | Chemical Engineering |
| Bittner, Steve | University of Oklahoma | Geographical Aquatic Ecology |
| Bowen, Justin | Oklahoma State University | Microbiology & Molecular Genetics |
| Buckholtz, Jody | Northeastern State University | Chemistry |
| Burgess, Alexis | Southeastern OSU | Medical Sciences |
| Canales, Jailene | University of Central Oklahoma | Biomedical Science |
| Carriere, Austin | University of Oklahoma | Animal Behavior/Herpetology |
| Carson, Trevin | Langston University | Computer Science |
| Carter, Tuana | Langston University | Computer Science |
| Ceballos, Michael | University of Arkansas | Biological Sciences |
| Chicas-Mosier, Ana | Oklahoma State University | Interdisciplinary Toxicology |
| Clower, Hadley | Southeastern OSU | Medical Sciences |
| Cordova, Christopher | University of Central Oklahoma | Applied Mathematics |
| Cosby, Caitlin | Southeastern OSU | Biochemistry |
| Costain, Erika | Southeastern OSU | Biology/Chemistry |
| Cothran, Rickey | Southwestern OSU | Ecology |
| Cotton, Celeste | Langston University | Biology |

| Name | Institution | Academic Discipline |
|---|---|---|
| Craft, Kaci | Langston University | Biology |
| Croci, Darlene | Oklahoma State University | OK-LSAMP |
| Crone, Sarah | Southwestern OSU | Chemistry |
| Cruz Turrubiartes, Carolyn | University of Oklahoma | Mechanical Engineering |
| Davis, Taleigh | Southwestern OSU | Natural Sciences |
| DeHart, Jasmine | University of Oklahoma | Computer Science |
| Deroin, Rainee | Oklahoma State University | Environmental Science |
| Dew, Jovette | Oklahoma State University | Diversity Academic Support |
| Diaz, JC | The University of Tulsa | Computer Science & Mathematics |
| Dorko, Allison | Oklahoma State University | Mathematics |
| Dumas, Zachary | University of Central Oklahoma | Research and Sponsored Programs |
| Dunlap, Rylee | Southeastern OSU | Biology & Psychology |
| Eastep, Carley | Oklahoma State University | Chemical Engineering |
| Easter, Katie | Northeastern State University | Integrative Biology |
| Eaton, Raegan | Oklahoma State University | Biochemistry |
| Eix, Emily | University of Oklahoma | Microbiology |
| Escobar, Jennifer | University of Oklahoma | Chemical Biosciences |
| Ewing, Essences | Oklahoma State University | Microbiology |
| Fails, Tyler | Langston University | Computer Science |
| Faneros, Michael | University of Oklahoma | Psychology |
| Figueroa Jr., Luis | University of Oklahoma | Chemical Engineering |
| Fixico-Hardison, Marly | Oklahoma State University | Biology |
| Fletcher, Terin | Southwestern OSU | Biochemistry |
| Flores, Karina | University of Oklahoma | Biology |
| Ford Versypt, Ashlee | Oklahoma State University | Chemical Engineering |
| Franco Jr., Victor | Oklahoma State University | Mechanical Engineering |
| French, Donald | Oklahoma State University | Integrative Biology |
| Garcia, Shelby | University of Central Oklahoma | Biology |
| Gonzales, Andrew | Oklahoma State University | Computer Engineering |
| Gorbet, Michael | Oklahoma State University | Veterinary Biomedical Science |
| Gray Ngnadoh, Shanice | Oklahoma State University | Engineering Technology |
| Gunnars, Pierce | Oklahoma State University | Mechanical Engineering |
| Gunnars, Tabitha | Oklahoma State University | Zoology |
| Gutierrez, Carina | University of Central Oklahoma | Virology Research |
| Haley, Joseph | Oklahoma State University | Physics |
| Hall, Nadia | The University of Tulsa | Research & Graduate Studies |
| Hartnett, Rachel | Oklahoma State University | Integrative Biology |
| Hawkins, Ashlee | Oklahoma State University | Microbiology/Cell & Molec Biology |
| Hayden, Daniel | University of Oklahoma | Plant Biology |
| Hedgecock, Tayler | Southeastern OSU | Biology |
| Henriquez, Brandon | Oklahoma State University | Entomology & Plant Pathology |
| Hernandez Moreno, Isaac | Oklahoma State University | Engineering |

| Name | Institution | Academic Discipline |
|---|---|---|
| Herrera, Brandy | University of Oklahoma | Economics |
| Holden, Jaron | Oklahoma State University | Chemistry |
| Hubin, Tim | Southwestern OSU | Chemistry |
| Husak, Michael | Cameron University | Biology |
| Hussaini, Razi | The University of Tulsa | Chemistry & Biochemistry |
| Jackson, Jerreme | Oklahoma State University | Microbiology & Molecular Genetics |
| Jesse, Sean | East Central University | Mathematics |
| Jones, Don | University of Oklahoma | Chemical Engineering |
| Jones, Hezekiah | Cameron University | Chemistry |
| Jones, Kamon | Oklahoma State University | Zoology |
| Juarez, Luis | The University of Tulsa | Chemical Engineering |
| Kirksey, Jason | Oklahoma State University | Intuitional Diversity |
| Knox, Cheyenne | Oklahoma State University | Zoology Pre-Veterinary Medicine |
| Kone, Gbeu | Oklahoma State University | Chemical Engineering |
| Lawson Bonser, Lisa | Northeastern State University | Biology |
| Lee, Chunghao | University of Oklahoma | Bioengineering |
| Lee, Jasmyn | Oklahoma State University | Civil-Environmental Engineering |
| Lewis, Sharon | Langston University | Biochemistry |
| Lopez, Alexandra | Oklahoma State University | Biosystems & Agricultural Engineering |
| Lopez, Rosa | University of Oklahoma | Mechanical Engineering |
| Ludrick, Brad | Southeastern OSU | Biology/Science Education |
| Lutter, Erika | Oklahoma State University | Microbiology |
| Maharry, Tim | Northwestern OSU | Math & Computer Science |
| Manning, Angelica | Southwestern OSU | Biology |
| Manning, Landon | The University of Tulsa | Computer Science |
| Marlin, Caleb | OU-Health Science Center | Graduate Program in Biomedical Sciences |
| Marquez, Alma | University of Central Oklahoma | Biology |
| Martinez, Marco | Southwestern OSU | Computer Science |
| McCoy, Jacee | Oklahoma State University | Biochemistry |
| McDowell, Brittiana | Langston University | Chemistry |
| McKinnon, Elizabeth | Langston University | Chemistry |
| McNeill, Madison | East Central University | Biology |
| Means, Nicolas | OU-Health Science Center | Graduate Program in Biomedical Sciences |
| Mercer, Arissa | Southwestern OSU | Biology |
| Miller, Dashari | Langston University | HYPER |
| Miller, Rita | Oklahoma State University | Cell & Molecular Biology |
| Mills, Josh | Guest | |
| Minnis, Montana | University of Oklahoma | Chemical Engineering |

| Name | Institution | Academic Discipline |
|---|---|---|
| Moore, Cayla | Langston University | Natural Sciences |
| Moore, Joi | University of Oklahoma | Microbial Ecology |
| Morales, Brenda | Oklahoma State University | OK-LSAMP |
| Morris, Myshal | Langston University | Biology |
| Motte, Charmaine | Oklahoma State University | Graduate College |
| Muchiri, Allison | Oklahoma State University | High Energy Physics |
| Naidoo, Gnanambal | Langston University | Biology |
| Nimsey, Abner | Southwestern OSU | Chemistry |
| Ogbeide, Hope | University of Central Oklahoma | Biology |
| Ojha, Sohita | Langston University | Biological sciences |
| Olson, Paul | University of Central Oklahoma | Environmental Biology |
| Palmer, Leland | Oklahoma State University | Physics & Electrical Engineering |
| Paris III, Restituto | Cameron University | Chemistry |
| Parmley, Christen | Oklahoma State University | Chemical Engineering |
| Patrauchan, Marianna | Oklahoma State University | Microbiology & Molecular Genetics |
| Peal, Lila | Langston University | Chemistry |
| Perez, Erik | Oklahoma State University | Mechanical Engineering |
| Perez, Linsday | Southeastern OSU | Biology |
| Phillips, Abigail | Southeastern OSU | Biological Health Sciences |
| Porter, Kay | Oklahoma State University | OK-LSAMP Retired |
| Porter, Tajinee | Langston University | Biology |
| Portier, Thomas | University of Oklahoma | Biology |
| Posey, Belle | Guest | |
| Posey, Donna | Guest | |
| Posey, John | Guest | |
| Posey, Michael | Guest | |
| Posey, Sierra | Oklahoma State University | Microbiology |
| Potts, Courtney | UNT-Health Science Center | Graduate School of Biomedical Sciences |
| Prado, Stephanie | University of Oklahoma | Mechanical Engineering |
| Premaratne, Gayan | Oklahoma State University | Chemistry |
| Price, Jessica | Oklahoma State University | Nutritional Science |
| Ramaswamy, Karthik | Oklahoma State University | Agricultural Economics |
| Richardson, Erin | Langston University | Chemistry |
| Ridge, Zach | OSU-Center for Health Sciences | Forensic Chemistry |
| Roof, Colby | Northeastern State University | Biology |
| Rozneck, Kennedy | University of Central Oklahoma | Nursing |
| Saenz, Adrian | Oklahoma State University | Biosystems Engineering |
| Salinas, Casandra | Oklahoma State University | Biochemistry & Molecular Biology |
| Salinas, Daniel | Oklahoma State University | Mechanical Engineering |
| Sambo, Haifah Boureima H | University of Oklahoma | Electrical Engineering |

| Name | Institution | Academic Discipline |
|---|---|---|
| Sanders, Tiana | Oklahoma State University | Wildlife Biology |
| Scheets, Kay | Oklahoma State University | Plant Biology, Ecology, & Evolution |
| Sherier, Allison | UNT-Health Science Center | Biomedical Science |
| Simon, Nicholas | Oklahoma State University | Integrative Biology |
| Spence, Alexis | Southeastern OSU | Biology/Chemistry |
| Stevens, Madison | Oklahoma State University | Natural Resource & Ecology Management |
| Swanson, Ayrianna | Oklahoma State University | Microbiology |
| Swaringim-Griffin, Julie | Oklahoma State University | Diversity Academic Support |
| Tadlock, Tanner | Southwestern OSU | Chemistry |
| Tasci, Latasha | Oklahoma State University | Scholar Development & Undergraduate Research |
| Taylor, Vivian | University of Oklahoma | Biology |
| Tolentino Ramos, Giovanni | University of Oklahoma | Biology |
| Villanueva, Carlos | University of Oklahoma | Mathematics |
| Wagner, Joseph | University of Central Oklahoma | Mechanical Engineering |
| Walden, Susan | University of Oklahoma | STEM |
| Wells, Becca | Northeastern State University | Cell & Molecular Biology |
| Williams, Courtney | Oklahoma State University | Industrial Engineering & Mgmt |
| Williams, Jordan | Langston University | Biology |
| Williams, Karen | East Central University | Physics |
| Williams, Kennedy | Southwestern OSU | Chemistry |
| Wilson, Marissa | Langston University | Biology |
| Wilson, Scott | Cameron University | Physics |
| Wilson Jr, Clyde | Oklahoma State University | McNair Scholars Program |
| Wu, Ning | Southeastern OSU | Biological Sciences |
| Youngblood, CheyAnne | Northeastern State University | Cell & Molecular Biology |

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## We hope to see you next year!

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