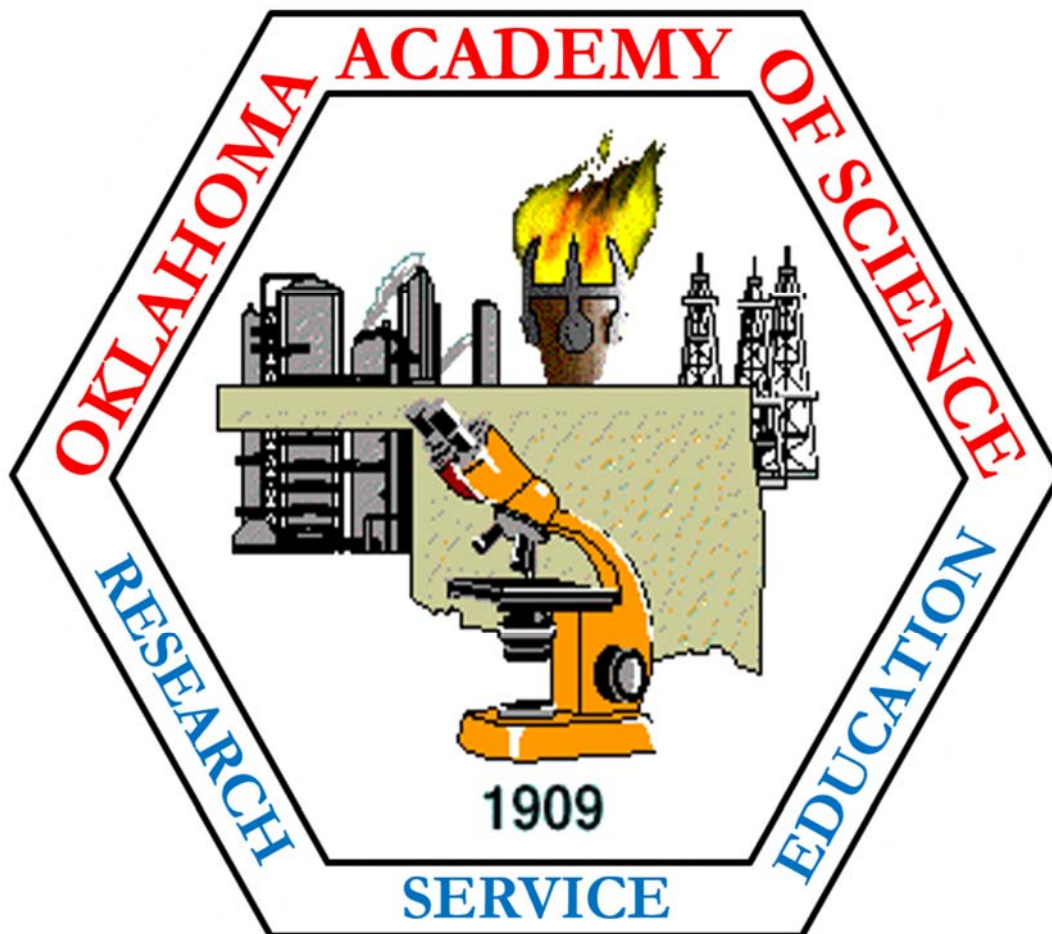


OFFICIAL PROGRAM OF THE
108th ANNUAL TECHNICAL MEETING
of the
OKLAHOMA ACADEMY OF SCIENCE

November 8, 2019

University of Central Oklahoma
Edmond



Affiliated with the
American Association for the Advancement of Science

**108th ANNUAL TECHNICAL MEETING
OKLAHOMA ACADEMY OF SCIENCE
UNIVERSITY OF CENTRAL OKLAHOMA
Edmond**

PROGRAM SUMMARY

Thursday, 7 November 2019

6:00 p.m. Executive Council Dinner/Meeting Room 227-Betz STEM

Friday, 2 November 2018

7:30 a.m. Registration for Technical Meeting NUC 3rd Floor

Concurrent Scientific Paper Sessions (8:00 - 11:15 a.m.)

Section A Biological Sciences – Botany NUC 326
Section A Biological Sciences – Zoology NUC 300
Section B Geology Howell Hall 202
Section C Physical Sciences Howell Hall 202
Section D Social Sciences NUC 304
Section E Science Communication and Education Howell Hall 202
Section G Applied Ecology and Conservation NUC 312
Section H Microbiology NUC 301
Section I Engineering Sciences Howell Hall 202
Section J Biochemistry and Molecular Biology NUC 314
Section L Mathematics, Statistics, & Computer Science..... NUC 312
Section N Biomedical Sciences NUC 314

Section Business Meetings (either 11:00 or 11:15)

Section A Biological Sciences – Botany & Zoology 11:15-11:30, NUC 326
Section B Geology 11:15-11:30, Howell Hall 202
Section C Physical Sciences 11:15-11:30, NUC 300
Section D Social Sciences 11:15-11:30, NUC 304
Section E Science Communication and Education 11:00-11:15, Howell Hall 202
Section F Geography 11:00-11:15, NUC 326
Section G Applied Ecology and Conservation 11:15-11:30, NUC 312
Section H Microbiology 11:00-11:15, NUC 301
Section I Engineering Sciences 11:00-11:15, NUC 300
Section J Biochemistry and Molecular Biology 11:00-11:15, NUC 314
Section L: Mathematics, Stats, & Comp. Science 11:00-11:15, NUC 312
Section M Environmental Sciences 11:15-11:30, NUC 301
Section N Biomedical Sciences 11:15-11:30, NUC 314

11:30 a.m. Academy Business Meeting..... NUC 326

All OAS members are encouraged to attend. Visitors are welcome.

12:00 p.m. Academy Luncheon & Speaker
Nigh University Center (NUC) – 3rd Floor Ballrooms
(Admission by ticket only)

1:30-3:00 p.m. Poster Session for All Sections
the 1st and 2nd floors of the Don Betz STEM Building,
located across the street immediately south of the Nigh University Center

LUNCHEON SPEAKER

“Bees: Are They the Most Important Organisms on Earth?”

John F. Barthell

Dr. John Barthell is the Provost and Vice President for Academic Affairs at the University of Central Oklahoma (UCO). He is an entomologist with 14 consecutive years of experience with the National Science Foundation’s Research Experiences for Undergraduates Program. During this time he has studied pollinators in Greece and the Republic of Turkey, providing nearly 100 students with experiences that support their pursuit of careers in science. Barthell is also an active member of the Council on Undergraduate Research and serves as a nationally elected Councilor for that organization. In his current role as a provost, and previous role as a dean, he has worked on many STEM-based initiatives that support student-centered research activities. Dr. Barthell received his Bachelor’s degree in Zoology and PhD in Entomology at the University of California (UC) at Berkeley before working as a postdoctoral associate at UC Davis and becoming a faculty member at UCO.

SPECIAL THANKS

UCO College of Mathematics & Science (Council dinner/meeting and meeting refreshments)

UCO Office of Academic Affairs (NUC meeting rooms)

Dr. Bobby Mather, Dr. David Bass, and Dr. Chad King for coordinating this year’s meeting.

UPCOMING MEETINGS

2020 Fall Field Meeting, tba

2020 Annual Technical Meeting on November 6 at East Central University in Ada

GENERAL INFORMATION

Name Badges: Name badges, provided upon registration, must be worn at all times by all individuals attending Academy section programs, business meetings, and luncheon. If your badge is not visible, you may be asked to leave by the persons in charge. Lost badges may be replaced at the registration desk upon verification of your registration documents. **All presenters must register and wear an official name badge.**

On-site Registration Fees:

Member - \$30.00	
Non-member - \$45.00	
Student - \$15.00	
UCO Student (not presenting) - free	Luncheon tickets (if available) - \$20.00

2019 and 2020 Dues are Payable: The OAS registration desk will accept dues payments.

Professional - \$30.00
Graduate/Undergraduate Student - \$20.00
Family - \$35.00
Life - \$600.00

Guidelines for Abstract Publication: Abstracts may be published in the *Proceedings of the Oklahoma Academy of Science*, subject to the editorial policies as stated in the most recent issue of the *POAS* and the review of the Editorial Board. Specific formatting instructions for abstracts may be found at www.oklahomaacademyofscience.org. Abstract publication fee is \$38. *POAS* editor is Dr. Mostafa S. Elshahed, mostafa@okstate.edu.

Executive Director: Inquiries concerning upcoming OAS activities and membership may be directed to Dr. David Bass, OAS Executive Director, Campus Box 90, University of Central Oklahoma, Edmond OK 73034, 405-974-5772, dbass@uco.edu.

Assistance or Information: Look for individuals with OAS badges or host ribbons. These are faculty and staff assigned to assist you.

No Smoking: Please, no smoking in any of the buildings on the campus.

Refreshments: Light refreshments will be served on the 3rd floor of the NUC during the morning and on the 1st and 2nd floors of the STEM building in the afternoon.

SECTION A: BIOLOGICAL SCIENCES

Section Chair: Michael Dunn; Vice-Chair: Richard Butler

BOTANY (NUC 326)

- 8:15-8:30 *USING MOLECULAR AND MORPHOLOGICAL DATA TO SEPARATE CRYPTIC SPECIES OF RAYLESS *GRINDELIA* (ASTERACEAE). Leann Monaghan. University of Oklahoma.
- 8:30-8:45 *THE EFFECTS OF LIGHT INTENSITY ON GROWTH AND CHLOROPHYLL PRODUCTION IN *CANNABIS*. Samantha Middleton and Stanley Rice. Southeastern Oklahoma State University.
- 8:45-9:00 *MEASURING CHANGES IN PHENOLOGY OF OKLAHOMA ASTERACEAE SPECIES USING HERBARIUM SPECIMENS. John A. Unterschuetz, Abigail J. Moore, and Jenna A. Messick. University of Central Oklahoma.
- 9:00-9:15 **USING RADSEQ TO EXAMINE GENETIC VARIATION IN OKLAHOMA'S *SORGHASTRUM NUTANS*. Chloe Paden and Abigail J. Moore. University of Oklahoma.
- 9:15-9:30 **PHENOTYPIC CHARACTERIZATION OF THE *ASCLEPIAS SYRIACA* - *A. SPECIOSA* HYBRID ZONE IN THE GREAT PLAINS OF THE UNITED STATES. Victor Andreev. Oklahoma State University.
- 9:30-9:45 RADSEQ PHYLOGENY OF ALPINE *CHERLERIA* (CARYOPHYLLACEAE): WHAT DO MORE DATA ACTUALLY TELL US? Abigail J. Moore¹ and Joachim Kadereit². ¹University of Oklahoma; ²Johannes Gutenberg Universitaet Mainz; Mainz, Germany.
- 9:45-10:00 MILKWEED AS AN INDICATOR SPECIES. Leah S. Dudley. East Central University.
- 10:00-10:15 DYNAMICS OF A BOTTOMLAND FOREST AT ARCADIA LAKE, OKLAHOMA COUNTY, OKLAHOMA. Chad B. King. University of Central Oklahoma.
- 10:15-10:30 AMERICAN CROSSROADS: DIGITIZING THE VASCULAR FLORA OF THE SOUTH-CENTRAL UNITED STATES. Mark Fishbein¹, Peter Fritsch², Bruce W. Hoagland³, Abigail J. Moore³, Danie Spalink⁴, and George A. Yatskievych⁵. ¹Oklahoma State University; ²Botanical Research Institute of Texas; ³University of Oklahoma; ⁴Texas A&M University; ⁵University of Texas at Austin.
- 10:45-11:00 FLORA OF OKLAHOMA INC. (Annual Meeting). Adam Ryburn (Oklahoma City University).
- 11:15-11:30 BIOLOGICAL SCIENCES SECTION MEETING

ZOOLOGY (NUC 300)

- 8:15-8:30 *UNDERSTANDING GENE EVOLUTION OF THE INSULIN PATHWAY THROUGH SYNTENY. Dorothy Walton¹, Lindsey J. Long¹, and Laura Reed². ¹Oklahoma Christian University; ²University of Alabama.
- 8:30-8:45 *THE EFFECT OF NICOTINE AND COTININE ON THE DEVELOPMENT OF *COCHLIOMYIA MACELLARIA* (FABRICIUS) (DIPTERA: CALLIPHORIDAE). Elise Hodges, Gautham Gautham, Heather Ketchum, and Eric Bright. University of Oklahoma.
- 8:45-9:00 *RAPTOR PERCH AND LOCATION PREFERENCES IN RURAL SOUTHWESTERN OKLAHOMA. Dani Whiting and Zach F. Jones. Southwestern Oklahoma State University.
- 9:00-9:15 *PHENOTYPIC PLASTICITY OF FRESHWATER AMPHIPODS. Connor Slattery. Southwestern Oklahoma State University.
- 9:15-9:30 *DIFFERENT GENES, SAME PROTEIN. Trey Smith, Jeremy Alexander, and Lindsey J. Long. Oklahoma Christian University.
- 9:30-9:45 SURVEY OF THE DISTRIBUTION, HABITAT, AND CURRENT AND HISTORICAL PRESENCE OF WHITE-NOSE SYNDROME IN THE TRI-COLORED BAT IN OKLAHOMA: YEAR 1. Brandi S. Coyner, Janet K. Braun, and Hayley C. Lanier. Sam Noble Museum.
- 9:45-10:00 PRELIMINARY TRENDS IN SMALL MAMMAL POPULATIONS AFTER TWO YEARS OF MARK-RECAPTURE RESEARCH IN THE GYPSUM HILLS OF WESTERN OKLAHOMA. Michelle L. Haynie¹, Francisca M. Mendez-Harclerode², Gloria M. Caddell¹, and Chad B. King¹. ¹University of Central Oklahoma; ²Bethel College.
- 10:00-10:15 EFFECTS OF BLOOD SAMPLING ON NESTLING SCISSOR-TAILED FLYCATCHERS (*TYRANNUS FORFICATUS*). Michael S. Husak and Diane Roeder. Cameron University.
- 10:15-10:30 BEHAVIORAL AND CORTICOSTERONE RESPONSES TO PREDATOR CHEMICAL CUES DIFFER IN THREAT-SENSITIVITY. Jake A. Pruett¹, Daniel M. Montgomery², and Diana K. Hews². ¹Southeastern Oklahoma State University; ²Indiana State University.

SECTION A: BIOLOGICAL SCIENCES (continued)

- 10:30-10:45 ASSESSING LETHAL AND NON-LETHAL EFFECTS OF ROADRUNNER FORAGING ON OKLAHOMA COLLARED LIZARDS. Troy A. Baird¹, Danielle S. O'Connor², and Charmaine L. Moya³. ¹University of Central Oklahoma; ²Oklahoma Medical Research Foundation.
- 10:45-11:00 IMPACTS OF ROADS AND MITIGATION EFFORTS ON THE VIABILITY OF DESERT TORTOISE (*GOPHERUS AGASSIZII*) POPULATIONS. J. Mark Peaden. Rogers State University.

Posters

- Poster 1 *LEAF HERBIVORE DAMAGE ON *ASCEPIAS VIRIDIS*. Getsemani Garcia-Perez and Leah S. Dudley. East Central University.
- Poster 2 *PRELIMINARY STUDY OF GENETIC DIVERSITY IN *GRINDELIA CILIATA*, A PROMISING BIOFUEL CROP NATIVE TO OKLAHOMA. Jude Birkenholz. University of Oklahoma.
- Poster 3 *THE USE OF 16S AND 18S RRNA METABARCODING TO DETERMINE THE COMPOSITION OF MICROBIAL COMMUNITIES ON FRESHWATER TURTLE SHELLS. Cameron Kedy, Casey Skalla, and Matthew Parks. University of Central Oklahoma.
- Poster 4 *A FLY'S LIFE. Mallori Mueller¹, Emmaline Prinz¹, Lindsey J. Long¹, and Genomics Education Partnership². ¹Oklahoma Christian University; ²Genomics Education Partnership: Washington University in St. Louis.
- Poster 5 *ANNOTATION OF CONTIG 25 IN *DROSOPHILA TAKAHASHII*. Harrison Martin, Cole McDonald, and Lindsay J. Long. Oklahoma Christian University.
- Poster 6 *ANNOTATION OF CONTIG31 IN *DROSOPHILA TAKAHASHII*. Hannah Tabor, Gaelle Umotoni Mihigo, Amy Giemza, and Lindsey J. Long. Oklahoma Christian University.
- Poster 7 *BOTTERI'S SPARROW DENSITY CHANGES WITH SPREADING NON-NATIVE HABITAT IN SOUTHEASTERN ARIZONA. Greyson C. Weedon and Zach F. Jones. Southwestern Oklahoma State University.
- Poster 8 *COMPARING TISSUE PRESERVATION APPROACHES FOR MAXIMIZING THE YIELD OF SMALL MAMMAL DNA. Lisa Ratliff, Giovanni Tolentino Ramos, and Hayley Lanier. University of Oklahoma.
- Poster 9 *EARN YOUR WINGS. Garrett Jones, Aaron Parrott, and Lindsey J. Long. Oklahoma Christian University.
- Poster 10 *GENE ANNOTATION OF CONTIG25 IN *DROSOPHILA TAKAHASHII*. Dakota Allen, Katie Young, and Lindsey J. Long. Oklahoma Christian University.
- Poster 11 **PROJECTED DISTRIBUTION OF TOXORHYNCHITES RUTILUS DUE TO CLIMATE CHANGE BY 2070. Daniel S. Marshall and Christopher J. Butler. University of Central Oklahoma.

SECTION B: GEOLOGY

Howell Hall 202

Section Chair: Kevin Blackwood

- 10:00-10:15 *USING CAVE AMPHIPODS AS BIOLOGICAL TRACERS TO DETERMINE HYDROGEOLOGICAL PARAMETERS IN KARST AQUIFERS. Michelle Allen, Laramie Edens, Jessica West, Cara Jackson, and Kevin Blackwood. East Central University.
- 10:15-10:30 A PRELIMINARY ASSESSMENT OF ARCHAEOLOGICAL LITHIC SOURCES WITHIN THE WESTERN ARBUCKLE MOUNTAINS OF SOUTH-CENTRAL OKLAHOMA. Thomas Thompson¹ and Kevin Blackwood². ¹Open Range Archaeology LLC.; ²East Central University.
- 11:15-11:30 GEOLOGY SECTION MEETING

SECTION C: PHYSICAL SCIENCES

Howell Hall 202

Section Chair, Karen Williams; Vice-Chair: Weldon Wilson

- 8:45-9:00 HIGH FREQUENCY STUDY OF THE ACOUSTIC AND MASS ATTENUATION COEFFICIENTS IN LEAD AND ALUMINUM. Karen Williams. East Central University.
- 9:00-9:15 SPEED OF GRAVITY – A NEWTONIAN CALCULATION. Weldon J. Wilson. University of Central Oklahoma.
- 9:15-9:30 COMPUTATIONAL MODELING OF ADVANCED MATERIALS FOR PHOTOVOLTAIC AND BIOSENSING APPLICATIONS. Benjamin O. Tayo. University of Central Oklahoma.
- 9:30-9:45 *THE CHEMICAL AND MECHANICAL NATURE OF BIOGELS. Augustus Greenwood and Amanda J. Nichols. Oklahoma Christian University.
- 9:45-10:00 *NUMERICAL MODELING AND SIMULATION OF A MICROFLUIDIC PLATFORM FOR ENRICHMENT OF LOW ABUNDANCE PROTEINS. Frances Matthews, Mohammad Hossan, and Sanjeeva Gamagedara. University of Central Oklahoma.
- 11:00-11:15 PHYSICAL SCIENCES SECTION MEETING (NUC 300)

Posters

- Poster 12 A COMPARISON AND EVALUATION OF SOLID STATE ILLUMINATION SPECTRA. Shelby Drake and Doug Bryhan. East Central University.
- Poster 13 AROMATIC MOLECULAR WIRES: HOMO LEVELS IN METHYL-SUBSTITUTED DIAMINONAPHTHALENES. Daniel M. McInnes. East Central University.
- Poster 14 *ISOLATION OF LIMONENE FROM ORANGE PEELS. Cassie Richardson and Charles Crittall. East Central University.
- Poster 15 *PHOTOPHYSICAL BEHAVIOR OF FLUORESCENT DYES IN CONFINED REVERSE MICELLE ENVIRONMENT. Melany Opolz, Nicholas O. Meaux, and Rajesh K. Nayak. Cameron University.
- Poster 16 *SEASONAL VARIATIONS OF F2 PEAK IN IONOSPHERE. SheKayla Love and Susmita Hazra. Cameron University.
- Poster 17 *SOLAR ACTIVITY VARIATION AND ITS EFFECT ON IONOSPHERIC ION DENSITY. Jonathan Risner and Susmita Hazra. Cameron University.
- Poster 18 *THE EFFECTS OF SOLVENT FLUORINATION ON SOLVATE IONIC LIQUIDS: ANION AGGREGATION AND ION TRANSPORT. Kylie Feightner and Christopher Burba. Northeastern State University.
- Poster 19 TRANSPORT AND RECOVERY OF IRON OXIDE, ALUMINUM OXIDE, AND TITANIUM DIOXIDE NANOPARTICLES THROUGH SEDIMENTARY ROCK. Dario Butler, Ricardo Buerra, George Wang, and Randall D Maples. East Central University.

**SECTION D: SOCIAL SCIENCES
NUC 304**

Section Chair: Jaclyn Maass; Vice-Chair: J. Adam Randall

- 8:00-8:15 *THE WOES OF MEN: A HISTORY AND ANALYSIS OF MEN'S RIGHTS ACTIVIST AND INVOLUNTARY CELIBATE MOVEMENTS, 1856- PRESENT. Katelyn Sargeant. University of Central Oklahoma.
- 8:15-8:30 *THE RELATIONSHIP BETWEEN ADVERSE CHILDHOOD EXPERIENCES, SHAME AND BEHAVIORAL INHIBITION AND AVOIDANCE. Taryn Donson and Vickie M. Jean. University of Central Oklahoma.
- 8:30-8:45 *SELF-LOVE AMONG WOMEN OF ALL AGES. Tykia Smith and Vicky M. Jean. University of Central Oklahoma.
- 8:45-9:00 *PLEASE DON'T THING ME. Bridgett McGill. University of Cental Oklahoma.
- 9:00-9:15 *PERCEIVING CHARACTERISTICS OF ABDUCTED CHILDREN. Taylor Pjesky and Robert Mather. University of Cental Oklahoma.
- 9:15-9:30 BREAK
- 9:30-9:45 *HOOK-UP CULTURE IN MINORITIES, FACTORS, AND EFFECTS. Dominique Harris. University of Cental Oklahoma.
- 9:45-10:00 *DEMOGRAPHIC INVESTIGATION USING GRAVESTONE ANALYSIS AT ROSE HILL CEMETERY, CHICKASHA, OKLAHOMA. Cassandra Poole. University of Science and Arts of Oklahoma.
- 10:00-10:15 *CHILDHOOD SEXUAL TRAUMA: EFFECTS ON THE DEVELOPMENT OF GENDER AND SEXUAL IDENTITY. Kelsie Harris. University of Cental Oklahoma.
- 10:15-10:30 *ADHD TREATMENT FOR COLLEGE STUDENTS. Abigail Ned. University of Cental Oklahoma.
- 10:30-10:45 **YOU LOVE YOURSELF ENOUGH FOR US BOTH: PERCEPTIONS OF NARCISSISTIC PARTNERS AND RELATIONSHIP OUTCOMES. Ebony Harrington. University of Cental Oklahoma.
- 10:45-11:00 JESUS OF NAZARETH VS JESUS THE CHRISTIAN: THE CREATION OF ONE'S TRUE JESUS. Patrick Kubier. University of Cental Oklahoma.
- 11:00-11:15 **LET'S CHECK YOU OUT: ARE YOU REALLY DOWN WITH DIVERSITY? Jaely Deleon-Wright. University of Cental Oklahoma.
- 11:15-11:30 SOCIAL SCIENCES SECTION MEETING

Posters

- Poster 20 *A PENNY FOR YOUR THOUGHTS: THE EFFECT OF POVERTY ON SELF-EFFICACY IN COLLEGE STUDENTS. Elena Adams and Vickie M. Jean. University of Central Oklahoma.
- Poster 21 *BIASES FOR NATIVE POPULATIONS FOR MISSING AND KIDNAPPED PERSONS. Kurtis Roberts. University of Central Oklahoma.
- Poster 22 *BIPOLAR DISORDER AND THE COLEX PROCESS. Kali Ware. Rose State College.
- Poster 23 *CAN CRYING PREDICT STRESS RESILIENCE? Ada Carnero, Hellen Yosef, Ambre Chambers, Tephillah Jeyaraj-Powell, and Nathaniel Stafford. University of Central Oklahoma.
- Poster 24 *COMFORTABILITY, INITIATION, AND GENDER EFFECTS ON INDIVIDUALS' ABILITY TO ACCEPT PHYSICAL AFFECTION. Candace Telford. University of Central Oklahoma.
- Poster 25 *COMPARING THE METHODS OF PAYMENT FORM ON SPENDING HABITS: A CASE STUDY. Celeste D Singleton and Vickie M Jean. University of Central Oklahoma.
- Poster 26 *CONVERSION/REPARATIVE THERAPY. Andrew Hedges. University of Central Oklahoma.
- Poster 27 *CYBER-SLACKING STUDENTS: THE EFFECT OF INTERNET USE AND DISTRACTIONS IN COLLEGE STUDENTS. Erin Scott and Vickie M. Jean. University of Central Oklahoma.
- Poster 28 *DO ADOLESCENTS HAVE SOCIAL SUPPORT WHEN THEY PLAY ONLINE GAMES? Thy Nguyen and Alicia Limke-McLean. University of Central Oklahoma.
- Poster 29 *EFFECTS OF ENVIRONMENT ON AGGRESSION. Christy Paramo. University of Central Oklahoma.
- Poster 30 *ENERGY DRINKS EFFECTS ON ANXIETY IN A FEMALE WITH PANIC DISORDER. Emily Felland. University of Central Oklahoma.
- Poster 31 *HOOK-UP CULTURE IN MINORITIES, FACTORS, AND EFFECTS. Dominique Harris. University of Central Oklahoma.

SECTION D: SOCIAL SCIENCES (continued)

Posters

- Poster 32 *IMPLICIT BIAS TOWARDS NEGATIVE STIMULI INDICATING DEPRESSION AMONG COLLEGE STUDENTS. Teresa Vu and Cheyenne Mealer. University of Central Oklahoma.
- Poster 34 *LET'S NOT JUDGE OUR THOUGHTS. Jynnel LaForteza. University of Central Oklahoma.
- Poster 35 **POTENTIALLY TRIADIC: ARE MINDSETS, TEST ANXIETY, AND SOCIO-ECONOMIC STATUS MORE RELATED THAN WE THINK? Kody Long, Christy Paramo, Gray Thomas, and Jaclyn Maass. University of Central Oklahoma.
- Poster 36 *RECREATIONAL READING REDUCES RAMPANT RESTLESSNESS: THE EFFECT OF ANXIETY AMONG COLLEGE STUDENTS. Mackenzie L. Blake and Vickie M. Jean. University of Central Oklahoma.
- Poster 37 *SPLIT-SECOND DECISIONS & UNINTENDED STEREOTYPING. Leanna Bell and Mickie Vanhoy. University of Central Oklahoma.
- Poster 38 *STOP HITTING THE SNOOZE NOW: THE CONSEQUENCES OF SLEEP DEPRIVATION. Tiara-Donn Kruta and Vickie M. Jean. University of Central Oklahoma.
- Poster 39 *SWEAT SCIENCE: THE ANALYSIS OF LIFE HISTORY THEORIES ON PHYSICAL EXERCISE. Brandon L. Ivey and Joe Randell. University of Central Oklahoma.
- Poster 40 *THE ACCURACY OF TACTILE PERCEPTION WITH AUDITORY CUES. Hannah Whitten. University of Central Oklahoma.
- Poster 41 *THE ANTECEDENT OF PROCRASTINATION AND IT'S EFFECT ON BEING LATE. Ileana M. Cruz and Vickie M. Jean. University of Central Oklahoma.
- Poster 42 *THE EFFECTS OF CHOICE THEORY: HOW CHOICE THEORY CAN IMPROVE ADD/ADHD SYMPTOMS. Elizabeth Pendley, Ariel Yeoman, and Vickie M. Jean. University of Central Oklahoma.
- Poster 43 *TRAUMA-INDUCED PTSD COUPLED BY SMOKING: FACING THE HARD TRUTH. Jamie Stafford. University of Central Oklahoma.
- Poster 44 *TRIBALISM IN OUR SOCIETY. Nierouz Alrashdan. University of Central Oklahoma.
- Poster 45 *VERBATIM VS. PARAPHRASED NOTE-TAKING. Caitlin Pratt and Jaclyn Maass. University of Central Oklahoma.

SECTION E: SCIENCE COMMUNICATION & EDUCATION

Howell Hall 202

Section Chair: Kathleen Coughlan

- 10:30-10:45 LAYING THAT TRASH ON OKLAHOMA: ESTIMATING THE AMOUNT OF GARBAGE ON OUR HIGHWAYS REQUIRES A KNOWLEDGE OF RESEARCH DESIGN. Stanley Rice. Southeastern Oklahoma State University.
- 10:45-11:00 **THE EFFECT OF ARGUMENT-BASED NAÏVE MODEL DEVELOPMENT UPON STUDENT CONTENT KNOWLEDGE AND PERCEPTION OF SCIENCE: MIDDLE SCHOOL SCIENCE CLASSROOM. Aaron Kidd, Elizabeth Allan, and Mike Nelson. University of Central Oklahoma.
- 11:00-11:15 SCIENCE COMMUNICATION & EDU. SECTION MEETING

Posters

- Poster 46 **SO WHAT? CAPTURING PARTICIPANT OUTCOMES IN CITIZEN SCIENCE PROJECTS. Cheyanne Olson and Nicole Colston. Oklahoma State University.

**SECTION F: GEOGRAPHY
NUC 326**

Section Chair: Brad Watkins

11:00-11:15 GEOGRAPHY SECTION MEETING

**SECTION G: APPLIED ECOLOGY & CONSERVATION
NUC 312**

Section Chair: Jerry Bowen; Vice-Chair: Julia Reid

- 8:00-8:15 *THE DIFFERENCE IN LEAF-TYING CATERPILLAR COMMUNITIES BETWEEN FOREST EDGE AND INTERIOR HABITATS. Cuishan Deng, Yongzhi Pan, Norbu Gurung, and H. George Wang. East Central University.
- 8:15-8:30 *COMPARISON OF MICROHABITAT SELECTION BETWEEN RIFFLE DWELLING DARTERS, THE ORANGETHROAT DARTER (*ETHEOSTOMA SPECTABILE*) AND ORANGEBELLY DARTER (*ETHEOSTOMA RADIOSUM*) IN UPPER BLUE RIVER OF OKLAHOMA. Kourtney Myskey. East Central University.
- 8:30-8:45 *A PRELIMINARY SURVEY OF FRESHWATER SPONGES IN OKLAHOMA. Emily Sample, Emily Boyer, Casie Hamill, Destiny Hamilton, Kyler Keef, Tyler McKenzie, Angela Spottedwolf, Rhonda Weigand, and Brenda Witt. Redlands Community College.
- 8:45-9:00 **FORGOTTEN KNOWLEDGE. THE CASE OF THE USE OF BUMBLE BEE HONEY BY THE MAPUCHE PEOPLE. Jose Montalva. East Central University.
- 9:00-9:15 MEDITERRANEAN GECKOS (*HEMIDACTYLUS TURCICUS*) AT THE UNIVERSITY OF CENTRAL OKLAHOMA ARE FOUND OUTSIDE IN WINTER. Allyson Fenwick, Samah Houmam, Briant Nguyen, Laura Kimmel, Susan McKenna, Mari Nguyen, and Madison Birdwell. University of Central Oklahoma.
- 9:15-9:30 GEOGRAPHIC PATTERNS IN YARD-DWELLING LAND SNAILS. Elizabeth A. Bergey, Matthew Carman, and Benjamin Whipkey. OK Biological Survey.
- 9:30-9:45 ANGLER CATCH AND ATTITUDES TOWARD BLACK BASS IN OZARK STREAMS. Andrew T. Taylor¹, James M. Long², Binod Chapagain³, and Omkar Joshi³. ¹University of Central Oklahoma; ²U.S. Geological Survey, Oklahoma Cooperative Fish and Wildlife Research Unit; ³Oklahoma State University.
- 11:15-11:30 APPLIED ECOLOGY & CONSERVATION SECTION MEETING

Posters

- Poster 47 *DIVERSITY OF LAND SNAILS IN ISOLATED HABITATS ON A COLLEGE CAMPUS. Paul Baumann, Matthew Carman, and Elizabeth A. Bergey. Oklahoma Biological Survey.
- Poster 48 **NUCLEAR AND MITOCHONDRIAL DNA SPECIES IDENTIFICATION FROM KEMP'S RIDLEY SEA TURTLE (*LEPIDOCHELYS KEMPII*) BONE SAMPLES AFTER OCEANIC AND TERRESTRIAL ENVIRONMENTAL EXPOSURE. Elizabeth Krestoff, James Creecy, Wayne Lord, Michelle Haynie, and Brandt Cassidy. University of Central Oklahoma.
- Poster 49 *PRELIMINARY ASSESSMENT OF A RIPARIAN FOREST ALONG THE WASHITA RIVER IN WESTERN OKLAHOMA. Bryler Atchley², Cody Hanks², Marco Donoso¹, Chad King¹, and Zach Jones². Southwestern Oklahoma State University.
- Poster 50 **PRELIMINARY INVESTIGATION OF THE ECOLOGY OF HARRIS MUD CRAB IN LAKE TEXOMA. Shelbie Weaver and David Bass. University of Central Oklahoma.
- Poster 51 *RESPONSE OF SNAILS TO CIGARETTE BUTT EFFLUENT. Mariam F. Shakir and Elizabeth A. Bergey. Oklahoma Biological Survey.
- Poster 52 TEMPORAL AND SPATIAL EVALUATION OF ACTIVITY PATTERNS ALONG THE GRAND LAKE SHORELINE BY GRAY BATS AND NORTHERN LONG-EARED BATS. Craig R. Zimmermann and Keith Martin. Rogers State University.
- Poster 53 *THE COLONIZATION OF ARTIFICIAL LEAF SHELTERS BY LEPIDOPTERAN LARVAE AND OTHER ARTHROPODS ON *QUERCUS RUBRA*. Yongzhi Pan and H. George Wang. East Central University.
- Poster 54 *TIMING OF AVIAN MIGRATION THROUGH THE OKLAHOMA CITY AREA 1995-2017 USING NOAA WEATHER DATA. Amy Hofeld and Zach F. Jones. Southwestern Oklahoma State University.

**SECTION H: MICROBIOLOGY
NUC 301**

Section Chair: Charlie Biles; Vice-Chair: Erika Lutter

- 8:00-8:15 *ROLE OF OUTER MEMBRANE PERMEABILITY IN CALCIUM INDUCED RESISTANCE TO POLYMYXIN B IN *PSEUDOMONAS AERUGINOSA*. Olga V. Michka, Tarosha B. Salpadoru. and Marianna A. Patrauchan. Oklahoma State University.
- 8:15-8:30 *ISOLATION OF GORDONIAPHAGES AND MICROBACTERIOPHAGES FROM COMPOST, SOIL, AND WATER SAMPLES. Cameron Kedy, Alyxandra Siemer, Destinee Wilkins, Umar Sahi, and Hari Kotturi. University of Cental Oklahoma.
- 8:30-8:45 *INCREASING GLUCONEOGENESIS PROVIDES A NOVEL MECHANISM FOR ANTIBIOTIC RESISTANCE. Brody Barton and Randy Morgenstein. Oklahoma State University.
- 8:45-9:00 *HOMOLOGY MODELING AND PURIFICATION OF B-CARBONIC ANHYDRASE FROM *STREPTOCOCCUS SANGUINIS*, AN OPPORTUNISTIC PATHOGEN INVOLVED IN SUBACUTE INFECTIVE ENDOCARDITIS. Emily Bedea. Southwestern Oklahoma State University.
- 9:00-9:15 *GENE ANNOTATION OF HYPOTHETICAL PROTEIN-CODING GENES OF *CHLAMYDIA CAVIAE*. Anna Bailey and Celestino Velasquez. Oral Roberts University.
- 9:15-9:30 *CHARACTERIZATION OF DIAPORTHE SPECIES IMPORTED ON GUATEMALA CANTALOUPE. Erin Dempsey, Sanam Kadel, Rita Ghale, Karuna Devkota, Charlie Biles, and Alisha Howard. East Central University.
- 9:30-9:45 *CHARACTERIZATION OF CELLULAR LOCALIZATION OF THE CALCIUM (CA²⁺) BINDING EF HAND PROTEIN EFHP AND ITS ABUNDANCE IN RESPONSE TO EXTRACELLULAR CA²⁺ IN *PSEUDOMONAS AERUGINOSA*. Emily S. Johnson, Biraj B. Kayastha, and Marianna A. Patrauchan. Oklahoma State University.
- 9:45-10:00 *ANTIFUNGAL ACTIVITY OF DENTRIC CELL LYSOSOMAL PROTEINS. Savannah Beakley, Ben Nelson, Sierra Posey, and Karen L Wozniak. Oklahoma State University.
- 10:00-10:15 *CARBONIC ANHYDRASE, PSCA1 CONTRIBUTES TO THE VIRULENCE OF THE HUMAN PATHOGEN *PSEUDOMONAS AERUGINOSA*. Reygan E. Braga, Biraj B. Kayastha, and Marianna A. Patrauchan. Oklahoma State University.
- 10:15-10:30 **SEQUENCE CONSERVATION OF THE NOVEL CALCIUM SENSOR IN *PSEUDOMONAS AERUGINOSA*. Rosalie Dohmen, Biraj B. Kayastha, and Marianna A. Patrauchan. Oklahoma State University.
- 10:30-10:45 **INTERACTIONS OF CRYPTOCOCCUS NEOFORMANS WITH HUMAN AIRWAY PHAGOCYTES. Benjamin N. Nelson¹, Cheyenne Daugherty¹, Vineet I. Patel², Jordan P. Metcalf², and Karen L. Wozniak¹. ¹Oklahoma State University; ²University of Oklahoma - Health Sciences Center.
- 10:45-11:00 **ELEVATED CALCIUM INDUCES RESISTANCE TO POLYMYXIN B IN *PSEUDOMONAS AERUGINOSA*. Tarosha B. Salpadoru¹, Sharmily Khanam¹, Kerry Williamson², Dirk L. Lenaburg¹, Michael J. Franklin², and Marianna A. Patrauchan¹. ¹Oklahoma State University; ²Montana State University.
- 1:30-1:45 **CALCIUM REGULATED PROTEIN, CARP, INTEGRATES MULTIPLE HOST SIGNALS AND MEDIATES CALCIUM REGULATION OF *PSEUDOMONAS AERUGINOSA* VIRULENCE. Michelle King, S. Mares, D. McLeod, L. Kafer, and M. Patrauchan. Oklahoma State University.
- 1:45-2:00 **ANALYSIS OF THE INTERACTIONS BETWEEN *CRYPTOCOCCUS NEOFORMANS* AND PULMONARY MACROPHAGE SUBSETS. Ashlee Hawkins, Brenden Determann, Benjamin Nelson, and Karen L. Wozniak. Oklahoma State University.
- 2:00-2:15 **A NOVEL BACTERIAL PHYLUM MCINERNEYBACTERIOTA, RECOVERED FROM A HIGH TEMPERATURE AND HIGH SALINITY TERTIARY OIL RESERVOIR IN NORTH CENTRAL OKLAHOMA, USA. Archana Yadav, Javier Vilcáez, Ibrahim F. Farag, Britny Johnson, Katherine Mueller, Noha H. Youssef, and Mostafa S. Elshahed. Oklahoma State University.
- 2:15-2:30 **IDENTIFYING PROTEINS WITH NOVEL ROLES IN *PSEUDOMONAS AERUGINOSA* BIOFILM FORMATION. Amal H. Yahya, William Colton, and Matthew T. Cabeen. Oklahoma State University.
- 2:30-2:45 IS THE CARP GENE, ENCODING CALCIUM-REGULATED PROTEIN, UNIQUE TO *PSEUDOMONAS AERUGINOSA*? Amal Khanov, M. King, S. Mares, and M. Patrauchan. Oklahoma State University.
- 11:00-11:15 MICROBIOLOGY SECTION MEETING

SECTION H: MICROBIOLOGY (continued)

Posters

- Poster 55 **CALCIUM CONCENTRATION AFFECTS THE HOST-PATHOGEN INTERACTIONS OF *PSEUDOMONAS AERUGINOSA* WITH LUNG EPITHELIAL CELLS. Deepali Luthra, Marianna Patrauchan, and Erika Lutter. Oklahoma State University.
- Poster 56 *CHARACTERIZATION OF THE IMPACT OF SYRINGAFACTIN ON HUMAN PATHOGEN CHEMOTAXIS AND MEMBRANE PERMEABILITY. Bryler Atchley, Kade Ezell, and Regina S. McGrane. Southwestern Oklahoma State University.
- Poster 57 **CLONING AND EXPRESSION OF *CHLAMYDIA TRACHOMATIS* INCLUSION MEMBRANE PROTEINS AND THEIR INTERACTING BINDING PARTNERS. Colleen 'Denver' La Force. Oklahoma State University.
- Poster 58 **EFFICACY OF INTRANASAL IMMUNIZATION WITH WHOLE-CELL FIXED *COXIELLA BURNETII* NINE MILE PHASE I ON SUBSEQUENT PATHOGENESIS USING A GUINEA PIG MODEL. Melissa Brewer and Edward I. Shaw. Oklahoma State University.
- Poster 59 *IDENTIFICATION OF BACTERIA THAT INHIBIT ENTEROCOCCUS GROWTH. Constance Green and April Nesbit. East Central University.
- Poster 60 *IDENTIFICATION, IN-SILICO ANALYSIS AND HOMOLOGY MODELING OF B-CARBONIC ANHYDRASES FROM FREE-LIVING AMOEBOZOANS, *ACANTHAMOEBA CASTELLANII* AND *NAEGLERIA GRUBERI*. Alexa Benedict. Southwestern Oklahoma State University.
- Poster 61 *IDENTIFYING MICROBIAL DIVERSITY ON FRESHWATER TURTLE SHELLS USING A 2-STEP METHOD FOR 16S METABARCODE AMPLIFICATION. Casey Skalla, Cameron Kedy, and Matthew Parks. University of Central Oklahoma.
- Poster 62 *MECHANISMS OF LYSOSOMAL CATHEPSIN B DEGRADATION OF *CRYPTOCOCCUS NEOFORMANS*. Brinley Cannon and Karen L. Wozniak. Oklahoma State University.
- Poster 63 MEDICAL STUDENTS' PREFERENCES FOR LEARNING COURSE CONTENT. Jennifer L. Kisamore¹ and Earl L. Blewett². ¹University of Oklahoma - Tulsa; ²Oklahoma State University - Center for Health Sciences.
- Poster 64 *MORPHOLOGICAL AND MOLECULAR CHARACTERIZATION OF PATHOGENIC *FUSARIUM* SPECIES FROM CENTRAL AMERICA AND OKLAHOMA. Sanam Kadel, Rita Ghale, Karuna Devkota, Leah Dudley, and Charlie Biles. East Central University.
- Poster 65 *PULMONARY DENDRITIC CELL SUBSET INTERACTIONS WITH *CRYPTOCOCCUS NEOFORMANS*. Brenden Determann II, Ashlee Hawkins, Benjamin Nelson, and Karen L. Wozniak. Oklahoma State University.
- Poster 66 *READERS DIGEST: MYCOBACTERIOPHAGE AND YOU. Emily Hernandez and Greg Mullen. Oklahoma City University.
- Poster 67 *THE EFFECT OF SALINITY AND LIGHT ON REPRODUCTIVE STRUCTURES OF DIAPORTHE SP., A PLANT PATHOGENIC FUNGI. Rita Ghale, Kabu Dangol, Sanam Kadel, Leah Dudley, and Charlie Biles. East Central University.
- Poster 68 *TREATMENT OF *PSEUDOMONAS AERUGINOSA* CORNEAL INFECTION WITH BIOENGINEERED LYSOCIN PYS2-GN4. Bailey Strecker¹, Jonathan J. Hunt¹, Ryan Heselpoth², Vincent A. Fischetti², and Michelle C. Callegan³. ¹Oklahoma Christian University; ²Rockefeller University; ³University of Oklahoma - Health Science Center.

SECTION I: ENGINEERING SCIENCES

Howell Hall 202

Section Chair: Nesreen Alsbou; Vice-Chair: Gang Xu

- 8:00-8:15 *SMART MEDICAL DEVICE. Erin Drewke, Jessica Petty, Mai Pham, and Nesreen Alsbou. University of Central Oklahoma.
- 8:15-8:30 *MICROWAVE IMAGING SYSTEM. Kyle Espinosa, Nathan Wickware, Nathaniel Ashley, and Nesreen Alsbou. University of Central Oklahoma.
- 8:30-8:45 *DEVELOPMENT OF A COMPUTATIONAL FLUID DYNAMIC MODEL TO STUDY FLAGELLAR BEATING. Joseph Wagner¹, Erin Drewke¹, Ann Almgren², Johannes Blaschke², and Gang Xu¹. ¹University of Central Oklahoma; ²Lawrence Berkeley National Lab.
- 11:00-11:15 ENGINEERING SCIENCES SECTION MEETING (NUC 300)

Posters

- Poster 69 *DESIGN A SPATIO-TEMPORAL FILTER WITH MOTION DETECTION TO ENHANCE THE CONTRAST OF GUIDEWIRE IN DIGITAL X-RAY FLUOROSCOPY. Michael Mariani and Yuhao Jiang. University of Central Oklahoma.
- Poster 70 *DESIGN, CHARACTERIZATION AND FLOW ANALYSIS OF BIODEGRADABLE FINE-MESHED FLOW DIVERTERS. Zack Maggard, Juby Varughese, Joseph Puskas, and Mohammad R. Hossan. University of Central Oklahoma.
- Poster 71 **EXPERIMENTAL ANALYSIS OF LASER MICROMACHINING OF COMMON MICROFLUIDIC SUBSTRATES. Naveen M. Thirunilath, Prashanth Reddy Konari, and Mohammad Robiul Hossan. University of Central Oklahoma.

SECTION J: BIOCHEMISTRY AND MOLECULAR BIOLOGY

NUC 314

Section Chair: Ellie Nguyen; Vice-Chair: Alisha Howard

- 10:30-10:45 *STUDYING YFAX IN *ESCHERICHIA COLI*. Brenna Hefley, Samantha Perry, and April Nesbit. East Central University.
- 10:45-11:00 **ANALYSIS OF RAC/RHO KINASE ON MYOFIBROBLAST CONTRACTION AND MIGRATION WITHIN A COLLAGEN MATRIX UTILIZING OPTICAL COHERENCE TOMOGRAPHY. Natthapume Attamakulsri, Melville B. Vaughan, and Gang Xu. University of Central Oklahoma.
- 11:00-11:15 BIOCHEMISTRY AND MOLECULAR BIOLOGY SECTION MEETING

Posters

- Poster 72 *ANALYSIS OF UNCHARACTERIZED PROTEIN 3H04. Amy Giemza, Gaele Mihigo, Susane Mihigo, and Lindsey J. Long. Oklahoma Christian University.
- Poster 73 *BIOLOGICAL CHARACTERIZATION OF A PEPTIDE ANTIBIOTIC PRODUCED BY A HALOPHILIC ARCHAEON. Amelia Shupe and Ratnakar Deole. Northeastern State University.
- Poster 74 *BOVINE LEUKEMIA VIRUS IN DAIRY MILK. Kennedy Clark, Daphnee Patrom-Jones, and Alisha Howard. East Central University.
- Poster 75 **EPIGENETIC REGULATION OF MICRORNA395 IN *ARABIDOPSIS* IN RESPONSE TO SULFATE DEPRIVATION. Pei Jia Ng and Ramanjulu Sunkar. Oklahoma State University.
- Poster 76 *IDENTIFICATION OF *PANTHERA* MTDNA AND REMOVAL OF PSUEDOGENE. Kaitlyn Hickey and Billi Bobala. University of Central Oklahoma.
- Poster 77 *PROTEIN YXIM_BACSU PUTATIVE FUNCTION THROUGH COMPUTATIONAL AND KINETIC ANALYSIS. Hadley G. LaMascus, Aaron E. Zahn, and Lindsey J. Long. Oklahoma Christian University.

**SECTION L: MATHEMATICS, COMPUTER SCIENCE, AND STATISTICS
NUC 312**

Section Chair: Nicholas Jacob; Vice-Chair: Michelle Lastrina

- 9:45-10:00 REGULAR POLYGONS IN HYPERBOLIC GEOMETRY. Andrew Wells. East Central University.
10:00-10:15 NETWORK CLASSIFICATION USING TOPOLOGY: CASE STUDIES ON MUSIC AND TEXT NETWORKS. Mehmet Emin Aktas. University of Central Oklahoma.
10:15-10:30 GRAPH PEBBLING - A GAME ON GRAPHS. Michelle Lastrina. East Central University.
10:30-10:45 BOOTSTRAPPING: AN OVERVIEW. N. C. Jacob. East Central University.
10:45-11:00 *GENERALIZED MODULAR POLYGONS. Effouehi Messou. University of Central Oklahoma.
11:00-11:15 MATHEMATICS, COMPUTER SCIENCE, AND STATISTICS SECTION MEETING

Posters

- Poster 78 *COST OF MMR VACCINE. Tracy McKibben, Nichole Beyer, and Benjamin Farnell. East Central University.
Poster 79 *NETWORK EMBEDDING: ON COMPRESSION AND LEARNING. Ginger Johnson and Esra Akbas. East Central University.
Poster 80 *USING REGULAR SEASON NBA DATA TO PREDICT PLAYOFF SUCCESS. Dineh Bohan and Michelle Lastrina. East Central University.

**SECTION M: ENVIRONMENTAL SCIENCES
NUC 301**

Section Chair: Dan McInnes; Vice-Chair: Charles Crittall

- 11:15-11:30 ENVIRONMENTAL SCIENCES SECTION MEETING

**SECTION N: BIOMEDICAL SCIENCES
NUC 314**

Section Chair: Bill Luttrell; Vice-Chair: Earl Blewett

- 8:00-8:15 *VIRAL REACTIVATION AND ENHANCED DISEASE ACTIVITY IN SYSTEMIC LUPUS ERYTHEMATOSUS PATIENTS. Rebecca A. Wood^{1,3}, Lauren Guthridge¹, Emma Thurmond¹, Carla Guthridge¹, Hua Chen¹, Wade deJager¹, Susan Macwana¹, Neelakshi Jog¹, Rebecka Bourn¹, Stan Kamp¹, Rufe Lu^{1,2}, Cristina Arriens¹, Eliza Chakravarty¹, Katherine Thanou¹, Joan T. Merrill¹, Joel M. Guthridge^{1,2}, and Judith A. James^{1,2}. ¹Oklahoma Medical Research Foundation; ²University of Oklahoma - Health Sciences Center; ³University of Central Oklahoma
- 8:15-8:30 *PHENOTYPICAL DIFFERENCES OF YOUNG AND OLD DUPUYTREN'S DISEASE CELLS: MIGRATION AND FOCAL ADHESION ANALYSIS. Austin Segrest and Melville Vaughan. University of Central Oklahoma.
- 8:30-8:45 *INVESTIGATION OF POSSIBLE ENVIRONMENTAL TRIGGERS FOR THE ONSET OF SARCOIDOSIS DISEASE SYMPTOMS. Emmaline Prinz. Oklahoma Christian University.
- 8:45-9:00 *INTERLEUKIN 33 EXPRESSION IN PATIENTS WITH HEPATITIS C VIRUS-ASSOCIATED CIRRHOSIS AND HEPATOCELLULAR CARCINOMA. Michelle Mwangi^{1,2}, Sarah Groover², Rashmi Kaul², and William Ranahan¹. ¹Oral Roberts University; ²Oklahoma State University - Center for Health Sciences.
- 9:00-9:15 *EVALUATION OF ENZYMATIC AND CHEMICAL EPIDERMAL-DERMAL SEPARATION TECHNIQUES OF RAT SKIN WITH IHC, PCR, AND WB ANALYSIS. Karissa LeHew^{1,2}, Michael B. Anderson², Kenneth E. Miller², Subhas Das², and Hal Reed¹. ¹Oral Roberts University; ²Oklahoma State University - Center for Health Sciences.
- 9:15-9:30 *EFFECTS OF A SERIES OF KETONE COMPOUNDS ON HEPATIC MICROSOMAL GLUCURONYLTRANSFERASE ACTIVITY IN MICE—IMPLICATIONS FOR KETONE-DRUG INTERACTIONS. Jeremy S. Alexander and William E. Luttrell. Oklahoma Christian University.
- 9:30-9:45 *CORRELATING TELOMERE LENGTH WITH DISEASES AND NOVEL GENETIC VARIANTS. Peter Gerstenberger^{1,2}, Patrick Allaire², Scott Hebring², and Celestino Velasquez¹. ¹Oral Roberts University; ²Marshfield Clinic Research Institute, Center for Human Genetics, Marshfield, WI.
- 9:45-10:00 INVESTIGATION OF ANTI-PROLIFERATION AND ANTI-INVASIVE EFFECTS OF *TARAXACUM OFFICINALE* ON HELA CELLS. Christina Hendrickson, Melville B. Vaughan, Chigozie Agu, Brooke Wiens, and Eleanore DeCelle. University of Central Oklahoma.
- 11:15-11:30 BIOMEDICAL SCIENCES SECTION MEETING

Posters

- Poster 81 CLONING AND SEQUENCING OF THE DEPOLYMERASE-LIKE GENE FROM BACTERIOPHAGE J25. Nayna Nambiar¹, Shrea Tyagi², B.J. Reddig³, P. Litt⁴, D. Jaroni⁴, and E.L. Blewett³. ¹Holland Hall, Tulsa, OK; ²Union High School, Tulsa, OK; ³Oklahoma State University - Center for Health Sciences; ⁴Oklahoma State University.
- Poster 82 *BRAIN IRRADIATION AND CEREBROMICROVASCULAR SENECE. Abigail Voth¹, Priya Balasubramanian², and Andriy Yabluchanskiy². ¹Oklahoma Christian University; ²University of Oklahoma - Health Sciences Center.
- Poster 83 *ANTI-PROLIFERATION EFFECT OF DANDELION'S EXTRACT ON HELA CELLS. Chigozie Agu, Eleanor DeCelle, Brooke Wiens, and Christina Hendrickson. University of Central Oklahoma.
- Poster 84 *EFFECT OF PHENYLALANINE, RETINOIC ACID, AND DIETHYLAMINOBENZALDEHYDE ON PROLIFERATION OF O9-1 MOUSE CRANIAL NEURAL CREST CELLS. Nazka Nurbyek, Michaela L Vance, Gabriella M Smith, and Nikki J Seagraves. University of Central Oklahoma.
- Poster 85 *DANDELION EXTRACT'S INHIBITORY EFFECT ON HELA CELLS' MIGRATION. Eleanor DeCelle, Brooke Wiens, Clinton Agu, and Christina Henderickson. University of Central Oklahoma.
- Poster 86 *EXTRACTS FROM SEA SPONGES INHIBIT FIBROBLAST MIGRATION. Makayla N. McGuire and J. Tyler Babek. University of Central Oklahoma.
- Poster 87 *HPLC METHOD DEVELOPMENT AND VALIDATION FOR QUANTITATIVE DETERMINATION OF LUNG CANCER BIOMARKERS IN URINE. Jia Xuan Mak, Hezha Rasul, and Sanjeewa Gamedara. University of Central Oklahoma.
- Poster 88 INHIBITION OF CLINICAL ENTEROVIRUS ISOLATES BY NATURAL COMPOUND OSW-1. B. J. Reddig¹, Brett Roberts², Anthony Burgett², and Earl Blewett¹. ¹Oklahoma State University - Center for Health Sciences; ²University of Oklahoma
- Poster 89 *ISOLATING BIOACTIVE COMPOUNDS FROM MARINE INVERTEBRATES. Kendra Brogden, Michelle Pham, Rigo Peruch, and Amanda L. Waters. University of Central Oklahoma.
- Poster 90 *MOLECULAR MECHANISMS OF CARDIAC TERATOGENICITY IN AVIAN MATERNAL PKU. Jailene S Canales, Kayley A Pate, Kayle G Patatanian, Jamie N Watson, and Nikki J Seagraves. University of Central Oklahoma.

* Undergraduate ** Graduate

- Poster 91 *GENOME ANNOTATION OF CONTIG 54 IN *DROSOPHILA TAKAHASHII*. Ngozi Iwunze and Brant Smith. Oklahoma Christian University.
- Poster 92 *THE EFFECTS OF DAY-TIME NAPPING ON STRESS LEVELS IN COLLEGE STUDENTS MEASURED BY CORTISOL CONCENTRATIONS IN SALIVA. BreAnn Tolleson and Katarzyna Roberts. Rogers State University.
- Poster 97 CLONING, SEQUENCING, AND IDENTIFICATION OF PHAGE 16, AN UNKNOWN *SALMONELLA* OR EHEC (ENTEROHEMORRHAGIC *E. COLI*) BACTERIOPHAGE. Shrea Tyagi¹, Nayna Nambiar², B.J. Reddig³, P. Litt⁴, D. Jaroni⁴ and E.L. Blewett³. ¹Holland Hall, Tulsa, OK; ²Union High School, Tulsa, OK; ³Oklahoma State University - Center for Health Sciences; ⁴Oklahoma State University.

ABSTRACTS

(sorted by presenter's last name)

Agu, Chigozie Eleanor DeCelle, Brooke Wiens, and Christina Hendrickson (University of Central Oklahoma)

*ANTI-PROLIFERATION EFFECT OF DANDELION'S EXTRACT ON HELA CELLS

We are currently working on a project that is determining whether or not dandelion root has the ability to stop cancer cell growth. This prospect originates from a man in Turkey who claimed to be cancer free after 40 days of drinking the root juice every morning. By studying the effects of this juice in varying concentrations, we are looking to investigate the validity of this claim.

Aktas, Mehmet Emin (University of Central Oklahoma)

NETWORK CLASSIFICATION USING TOPOLOGY: CASE STUDIES ON MUSIC AND TEXT NETWORKS

Information networks are becoming increasingly popular to capture complex relationships across various disciplines, such as social networks, citation networks, and biological networks. The primary challenge in this domain is measuring similarity or distance between networks. In this talk, I will introduce a topological method for the network classification problem. Inspiring from heat diffusion, I will first define the diffusion Fréchet function (DFF) on Euclidean space and networks. Then, I will employ this function to encode the topological features of networks and use these features for classification. I will share experimental results on two different networks: music networks and text networks. In the first experiment, we analyze the Turkish makam music, a system of varied melodies and chords. Our main goal is to classify the makams using their notes. We first represent each song with weighted networks where vertices and edges correspond to musical notes and their co-occurrences respectively. Then, we define DFF over these networks to encode the network topology and finally reach our goal by combining the function values with machine-learning algorithms. Our experiments show that such network representation with the diffusion Fréchet function is promising in classifying makam music and more effective than the n-gram technique, which is the most-used automated makam classification method. In the second experiment, we classify the Holy Quran chapters based on the place each chapter was revealed. We first represent each chapter with a weighted network where vertices and edges correspond to words and their co-occurrences in the text. Then, we similarly define DFF on these networks and employ machine learning techniques for text classification. As it happens in music networks, our method is more effective than the n-gram technique, which is the commonly used text classification method.

Alexander, Jeremy S. and William E. Luttrell (Oklahoma Christian University)

*EFFECTS OF A SERIES OF KETONE COMPOUNDS ON HEPATIC MICROSOMAL GLUCURONYLTRANSFERASE ACTIVITY IN MICE—IMPLICATIONS FOR KETONE-DRUG INTERACTIONS

Objectives: Exposure to toxic chemicals in the workplace can alter the way the body responds to the administration of therapeutic drugs. Studies have shown that some ketones can produce liver microsomal enzyme enhancement. The purpose of this study was to determine the effect of ketone exposure on the activity of Phase II drug metabolizing enzymes, as represented by microsomal glucuronyltransferase activity in vitro. In order to determine if the molecular weight of the ketone compound influences degree of enzyme enhancement, five ketones of increasing molecular weight (acetone, 2-butanone, 2-pentanone, 2-hexanone, and pinacolone) were selected for exposing microsomes. **Methods:** Whole livers from male CD-1 mice (n = 40) were removed to provide microsomal tissue for control and five ketone groups (n = 6 in each group). Liver microsomes were isolated and glucuronyltransferase activity was determined spectrophotometrically. When 2-aminophenol (2-AP) is glucuronidated, it forms 2-aminophenyl glucuronide (2-APG). Enzyme activities were expressed as nmol 2-APG formed per milligram microsomal protein per minute. Linearity studies for the glucuronyltransferase assay and screening studies with ketones were completed before microsomes were exposed to a range of concentrations of the ketones. Using Michaelis-Menten enzyme kinetic studies, Km and Vmax values were determined for glucuronyltransferase in control and treated microsomes. **Results:** Glucuronyltransferase activities were increased following exposure to higher concentrations of most of the ketone compounds. In general, there was increasing enzyme activity with increasing molecular weight of the ketone compounds. **Conclusions:** Exposure to ketone compounds caused an increase in liver glucuronyltransferase activity in mice. This has implications for humans that may also show an increase in drug-metabolizing enzyme activities following exposure to ketones in the workplace, potentially resulting in ketone-drug interactions. Future in vivo studies will include pretreatment of mice with ketones using doses that may estimate typical human exposure concentrations in the workplace.

Allen, Michelle, Laramie Edens, Jessica West, Cara Jackson, and Kevin Blackwood (East Central University)

*USING CAVE AMPHIPODS AS BIOLOGICAL TRACERS TO DETERMINE HYDROGEOLOGICAL PARAMETERS IN KARST AQUIFERS

Groundwater flow in karst aquifers is largely anisotropic, especially within the epi-phreatic zone where water table fluctuations occur. Beneath this zone, the hydrogeology may behave more isotropically on shorter time scales in equilibrium conditions as hydrostatic pressure is more evenly distributed. Understanding the flow characteristics within this zone is difficult as chemical tracer tests are difficult and expensive to perform. Therefore, this study uses cave amphipods as biological tracers to assist in determining hydrogeologic parameters in karst aquifers. Cave amphipods are small and capable of navigating through fracture apertures of

Andreev, Victor (Oklahoma State University)

**PHENOTYPIC CHARACTERIZATION OF THE *ASCLEPIAS SYRIACA*-*A. SPECIOSA* HYBRID ZONE IN THE GREAT PLAINS OF THE UNITED STATES

Hybridization in the milkweed genus *Asclepias* (Apocynaceae) is not common, although there are over 20 cases of interspecific hybridization documented among the approximately 130 species in the Americas. The most promiscuous among these is common milkweed, *Asclepias syriaca*, that hybridizes with at least seven other species, including showy milkweed *A. speciosa*. The *A. speciosa* – *A. syriaca* hybrid zone extends from Kansas to North Dakota and Minnesota. It occurs on a strong precipitation gradient that

* Undergraduate ** Graduate

separates the parental species. *A. speciosa* and *A. syriaca* are distinguished by differences in reproductive and vegetative morphology. *A. syriaca* has inflorescences with many small flowers and ovate to narrowly oblong leaves, whereas *A. speciosa* has inflorescences with fewer, big flowers and broadly ovate leaves. In putative hybrids these traits show intermediate morphology. To further characterize phenotypical differences between *A. syriaca* and *A. speciosa* and their hybrids and to assess the direction and extent of hybridization between *A. syriaca* and *A. speciosa* using phenotypic data, I measured 9 vegetative and 6 floral traits on 193 specimens. Analysis of the specimens revealed that hybrids exhibit a spectrum of morphological traits intermediate between the parental species, which can be indicative of introgressive hybridization between *A. syriaca* and *A. speciosa*. According to principal component analysis most hybrids morphologically gravitate to *A. speciosa*. ANOVA showed that most morphological traits are significantly different between *A. syriaca* and *A. speciosa*. The Mantel test showed no significant correlation between morphological and geographical distances in the parental species ($R = -0.83$, $p = 0.76$), thus the intermediate morphology of individuals where the parental ranges converge can be explained better by ongoing introgressive hybridization than the existence of clines.

Attamakulsri, Natthapume, Melville B. Vaughan, and Gang Xu (University of Central Oklahoma)

****ANALYSIS OF RAC/RHO KINASE ON MYOFIBROBLAST CONTRACTION AND MIGRATION WITHIN A COLLAGEN MATRIX UTILIZING OPTICAL COHERENCE TOMOGRAPHY**

Dupuytren's contracture (DC) is a condition where connective tissue continuously grows in the palm of the hand and becomes scar-like, attaching to the tendon sheaths found in the fingers. This tissue will thicken and pull the finger towards the hand, limiting the range of motion. DC cells (myofibroblasts) use migration and contraction properties, so our goal was to study migration and contraction using an in vitro scar tissue model (collagen matrices containing DC myofibroblasts under tension). To test this, we inhibited the activity of small G-proteins that manage each activity; Rac (migration) and Rho (contraction) kinases. In order to study migration and contraction, a set of collagen matrices were made and treated with each kinase separately and as a mixture. The collagen matrices were scanned under optical coherence tomography to look for differences in height, which indicates differences in mechanical tension caused by migration and contraction. We found that inhibiting Rho kinase reduced the mechanical tension in the matrix. Rac kinase inhibition similarly reduced tension, but to a lesser extent. This implies that Rac and Rho kinase will both inhibit collagen matrix contraction and migration. Further investigation will focus on separating migration from contraction between Rac and Rho kinase utilizing western blot analyses.

Bailey, Anna and Celestino Velasquez (Oral Roberts University)

GENE ANNOTATION OF HYPOTHETICAL PROTEIN-CODING GENES OF *CHLAMYDIA CAVIAE

Genetic information for a multitude of microorganisms has become readily available due to advances in genome sequencing. However, several of these novel genome sequences remain unexplored and require manual annotation to uncover their hypothetical protein-coding genes. The functions of these hypothetical genes can be predicted from their primary amino acid sequences by using various publicly available online bioinformatics tools, such as BLAST, T-Coffee, TMHMM, SignalP, Phobius, and PSORTb. Examples of properties identified by these programs include protein families, conserved domains, signal peptides, transmembrane regions, open reading frames, and protein subcellular localization. The purpose of this research project is to predict the functions of five unannotated hypothetical protein-coding genes in the genome of the bacterium *Chlamydia caviae*, which infects the mucosal epithelium of rodents. The genes CCA_RS04585, CCA_RS04590, CCA_RS04595, CCA_RS04600, and CCA_RS04605, were analyzed and are predicted to code for the following: glycerol-3-phosphate dehydrogenase (NAD(P) (+)), an outer membrane protein, two type-III secretion system family proteins, and phosphoenolpyruvate carboxykinase, respectively. These predictions provide some insight into the proteome of *Chlamydia caviae*. Ultimately, the proposed gene annotations must be validated through molecular cloning and biochemical methods to determine whether *Chlamydia caviae* expresses these proteins and whether they perform their bioinformatically predicted functions.

Baird, Troy A.¹, Danielle S. O'Connor², and Charmaine L. Moya³ (¹University of Central Oklahoma; ²Oklahoma Medical Research Foundation)

ASSESSING LETHAL AND NON-LETHAL EFFECTS OF ROADRUNNER FORAGING ON OKLAHOMA COLLARED LIZARDS

We assessed the lethal and non-lethal impacts of foraging by greater roadrunners (*Geococcyx californianus*) on free-ranging collared lizards. To assess lethal effects, mortality of marked lizards was monitored during the 2012 reproductive season prior to when roadrunners occurred on our study site and compared with lizard mortality in 2017 when two breeding pairs, and later their offspring, foraged on two of these lizard habitat patches. Possible non-lethal effects were assessed by comparing three measures of male lizard behavior (foraging acts, rates of travel and display), as well as growth rates in both males and females occupying habitat zones that experienced different levels of roadrunner activity. In 2017 lizard mortality rates were higher in 2017 in the two habitat zones where roadrunners nested and foraged relative to mortality in 2012 when roadrunners were absent. By contrast mortality was similar in a third zone where roadrunners were absent in both 2017 and 2012. Non-lethal effects of roadrunner activity on rates of foraging, display, and travel by males, and growth rates in both males and females were not observed in 2017 lizards. Although we cannot reject other possible explanations, our findings are consistent with the hypothesis that the transient activity of roadrunners at our study site during the 2017 collared lizard reproductive season increased predation-induced mortality, but the episodic increase in roadrunner activity did not have non-lethal effects on this population.

Barton, Brody and Randy Morgenstein (Oklahoma State University)

***INCREASING GLUCONEOGENESIS PROVIDES A NOVEL MECHANISM FOR ANTIBIOTIC RESISTANCE**

MreB is the most common bacterial actin homolog and is present in most rod-shaped cells. Actin plays many roles within the eukaryotic cell; however, not much is known about the protein interaction partners of MreB or its role in the cell beyond cell wall synthesis. MreB is known to be responsible for maintaining the rod shape of many bacteria and is an essential protein. In order to

determine if cells could survive without MreB, a subset of the *Escherichia coli* K-12 knockout collection (Keio) was screened for gene deletions that had an increased resistance to A22, an MreB depolymerization antibiotic. Gene ontology analysis showed the involvement of many genes involved in a variety of metabolic processes, as well as genes involved in DNA maintenance, stress response, and post-translational protein modifications. As there is a known link between metabolism and cell shape/size we decided to focus on the mechanism of A22 resistance from metabolic gene knockouts. Interestingly, genes involved in one-quarter of the enzymatic processes of the TCA cycle were found to have increased resistance to A22. Due to its high level of A22 resistance, malate dehydrogenase (*mdh*) was chosen for further study. We hypothesize that the knockout of *mdh* will cause a buildup of malate leading to an increase in gluconeogenesis and therefore, cell wall precursors. Metabolomics experiments show an increase production of gluconeogenesis products and cell wall precursors, allowing the cells to compensate for both MreB's and PBP2's loss of function through an increased MIC to A22 and the antibiotic mecillinam respectively. The addition of glucose to the medium provides an increase in resistance to A22 further confirming our hypothesis that an increase in cell wall precursor synthesis leads to an increased MIC to A22.

Beakley, Savannah, Ben Nelson, Sierra Posey, and Karen L Wozniak (Oklahoma State University)

*ANTIFUNGAL ACTIVITY OF DENDRITIC CELL LYSOSOMAL PROTEINS

Cryptococcus neoformans is an opportunistic fungal pathogen that has become increasingly prevalent in places stricken with the HIV/AIDS epidemic, and it can also infect other immunocompromised patients such as those with immune disorders, or those with certain immune weaknesses that can result from medication such as chemotherapies. Previous studies showed that dendritic cells (DCs) and DC lysosomal extract kill *C. neoformans*. Over 3000 proteins were identified by mass spectrometry in the DC lysosomal extract. We hypothesized that individual DC lysosomal proteins would inhibit the growth of *Cryptococcus*. In this study, we tested initially tested four of these proteins including neutrophil elastase, myeloperoxidase, matrix metalloproteinase 25 (MMP25), and striatin recombinant protein antigen (SRPA) for activity against *C. neoformans* in vitro. Results showed that neutrophil elastase, myeloperoxidase, and MMP25 had antifungal activity, while SRPA increased the growth of *Cryptococcus*. These proteins were tested for cytotoxicity, and all were non-toxic to mammalian cells. Additional studies in our lab showed that other lysosomal proteins nostrin and coronin also had antifungal activity. The next studies examined combinations of antifungal proteins to determine synergistic interactions. Results showed that the combination of MPO with MMP-25, nostrin or coronin enhanced the antifungal activity, while the combinations of MPO+nostrin, MPO+coronin, and nostrin+coronin did not enhance antifungal activity. Future studies will examine lysosomal proteins (individually or in combination) as therapies in the mouse model of cryptococcal infection.

Bede, Emily (Southwestern Oklahoma State University)

*HOMOLOGY MODELING AND PURIFICATION OF B-CARBONIC ANHYDRASE FROM *STREPTOCOCCUS SANGUINIS*, AN OPPORTUNISTIC PATHOGEN INVOLVED IN SUBACUTE INFECTIVE ENDOCARDITIS

Streptococcus sanguinis is part of the normal microbial flora in the human oral cavity and one of the leading causes of infective endocarditis (IE) in susceptible population. Although numerous virulence factors involved in IE have been identified, the exact mechanism by which *S. sanguinis* colonizes endocardium remains unclear. In addition to some well-characterized virulence factors, *S. sanguinis* also contains virulence-associated proteins that are not well characterized. One such protein that is associated with virulence is carbonic anhydrase (CA), which catalyzes the reversible hydration of CO₂ to bicarbonate. The goal of this study is to identify, analyze and purify β -carbonic anhydrase from *S. sanguinis* for biochemical and structural studies. We have identified an 18.2 kDa protein in *S. sanguinis* using BLAST analysis with significant homology to other well-studied β -carbonic anhydrases. This protein, henceforth known as SsaCanB is 165 amino acids long with no N-terminal signal peptide indicating its cytoplasmic localization. Homology modeling and subsequent structure analysis reveals that SsaCanB has a α/β fold typical of β -CA's. Analysis of the active site of SsaCanB shows conserved residues involved in zinc ion coordination similar to other well-studied β -CA's. Furthermore, the catalytic dyad (Asp/Arg) required for the activation of water molecule coordinated with zinc ion is also conserved in SsaCanB. The gene coding for SsaCanB was cloned into pET28a over-expression plasmid using traditional cloning strategies. The sequence verified construct was transformed into *E. coli* BL21(DE3) and SsaCanB over-expression was induced with isopropyl- β -thiogalactosidase in Terrific broth at 20°C. SDS-PAGE analysis revealed 19.8 kDa bands indicating successful over-expression of SsaCanB and the presence of these protein bands in soluble fraction indicated that SsaCanB is soluble under the conditions tested. Furthermore, over-expressed SsaCanB was successfully purified using immobilized metal affinity chromatography, which will be used for structural and biochemical studies.

Bergey, Elizabeth A., Matthew Carman, and Benjamin Whipkey (OK Biological Survey)

GEOGRAPHIC PATTERNS IN YARD-DWELLING LAND SNAILS

Snail assemblages in residential yards can be diverse and typically include both native and non-native species. Within a town, snail assemblages vary among yards, in part because of differences in yard management. This study aimed at exploring snail assemblages over a larger spatial scale to assess possible climatic influences. We anticipated that higher rainfall and warmer winter temperatures would be associated with greater snail diversity and abundance. Snails were surveyed in 12 towns in Oklahoma and Kansas that encompassed a N-S temperature gradient and an E-W rainfall gradient. Ten yards per town were surveyed using a timed 80 minute on-site visual search and a soil sample that was sorted in the lab. Shells and live snails were identified and counted. Results often differed from those hypothesized. Snail abundance was low in Kansas, consistent with the hypothesized effects of cold winters. However, numbers were also low in eastern towns, where we expected higher rainfall to result in more snails. This result is consistent with less watering in yards with greater rainfall and indeed, the soil surface was noticeably very dry in Lawrence and Idabel. Conversely, snail numbers were high in southern and western towns, consistent with a positive watering effect. Snail abundance was not related to species richness. Richness increased with rainfall in Kansas, but decreased with rainfall in southern Oklahoma. Effects of temperature were complex – colder winters reduced snail abundance but did not always reduce snail species richness - but the combination of cold

winters and low rainfall impacted both snail abundance and richness. We conclude that differential yard management (e.g., watering) across towns partly obscures effects of variation in climate on snail assemblages in yards.

Bohan, Dineh and Michelle Lastrina (East Central University)

***USING REGULAR SEASON NBA DATA TO PREDICT PLAYOFF SUCCESS**

This study is a continuation of a previous study and a more in-depth look at team data from the National Basketball Association (NBA). The previous study sought to find a way to pick NBA champions and to test if the more stats a team is in the top 10% in then the more likely it is that they are to be successful. However, this study was limited since it did not include many defensive stats, and the study only included teams that were in the top and bottom 10%. The continuation of this study seeks to address these limitations. This study analyzes NBA team data by converting the team per 100 possession season averages into z-scores and then running a regression to examine what stat categories contribute to success, and what categories can predict success in the playoffs. Additionally, we analyzed offensive and defensive team statistics and created a Total Offense Score and a Total Defense Score. Then we added the TOS and TDS to create the Total Team Score (TTS). These scores were developed by summing up the z-scores from the offensive and defensive team statistics. The goal was to create a new statistic that would indicate the best statistical team in a season and to test whether the TTS, TOS and the TDS are good at picking champions. We predict that teams that have a high TTS, TOS, and TDS will win more games and be more successful in playoffs than teams with low team scores.

Braga, Reygan E., Biraj B. Kayastha, and Marianna A. Patrauchan (Oklahoma State University)

CARBONIC ANHYDRASE, psCA1 CONTRIBUTES TO THE VIRULENCE OF THE HUMAN PATHOGEN *PSEUDOMONAS AERUGINOSA

Calcium deposition and calcification of soft tissue has been associated with several bacterial chronic infections including cystic fibrosis (CF). CF is associated with elevated levels of calcium in the body fluids resulting in calcification of organs. However, the exact molecular mechanisms of such calcification are not very clear. The opportunistic human pathogen *Pseudomonas aeruginosa* is the predominant cause of mortality and morbidity in CF patients. We hypothesized that this pathogen deposits extracellular calcium, a process that requires carbonic anhydrases (CAs). Previously, we have identified three β -class carbonic anhydrase genes, psCA1, psCA2 and psCA3 in *P. aeruginosa* PAO1. We showed that the expression of psCA1 is induced by elevated calcium and that this CA plays a major role in calcium deposition. We hypothesized that the ability of *P. aeruginosa* to deposit calcium enhances virulence of the pathogen and that psCA1 contributes to this process. To test this hypothesis, we used *Galleria mellonella* (wax worm) infection model. We observed that injection with PAO1 grown without added calcium resulted in death of up to 40% worms 20 hours post injection (hpi). However, injection with PAO1 grown at 10mM Ca²⁺ resulted in death of 80% worms 20 hpi. This supported the inducing effect of Ca²⁺ on *P. aeruginosa* virulence. The psCA1 deletion mutant failed to kill any worms even after 20 hpi, which demonstrated the importance of the enzyme in *P. aeruginosa* virulence. We also tested the effect of acetazolamide, earlier shown as an inhibitor of psCA1 enzymatic activity, but no significant impact on virulence was detected. We aim to use this model to study the effects of other CA inhibitors on PAO1 virulence. We also aim to determine the effect of calcium and other host factors on the transcription of psCA genes by using promoter activity approach both in vitro and in vivo.

Brogden, Kendra Michelle Pham, Rigo Peruch, and Amanda L. Waters (University of Central Oklahoma)

***ISOLATING BIOACTIVE COMPOUNDS FROM MARINE INVERTEBRATES**

Natural Products are secondary metabolites that can be extracted and isolated from any living organism. Due to their chemical diversity and biochemical relevance, the identification of bioactive compounds is of great interest to the pharmaceutical industry for their potential use towards the development of new medicine especially those that are cytotoxic to cancer cells. The brine shrimp (*Artemia* spp.) lethality assay is an appropriate preliminary screening of cytotoxic compounds since the brine shrimp's lethality correlates to the cytotoxicity of human cancer cells from the lung and colon lining. The aim of this work is to isolate and identify cytotoxic bioactive compounds for their potential use in pharmacology from fractionating active marine invertebrate extracts. The evaluated extracts are obtained from the University of Oklahoma Schmitz Sponge collection. Each extract is screened utilizing the brine shrimp assay at a low, medium, and high concentration (10.0 ppm, 50.0 ppm, and 100 ppm). Extracts indicating 70% lethality are considered active and will be fractionated by normal and reverse phase flash chromatography and their activity tested using the brine shrimp lethality assay. If fractions are still bioactive after reverse phase flash chromatography, they will be analyzed using nuclear magnetic resonance (NMR) spectroscopy, mass spectrometry, and infrared (IR) spectroscopy to elucidate the structure of the bioactive compound.

Canales, Jailene S. Kayley A Pate, Kayle G Patatianian, Jamie N Watson, and Nikki J Seagraves (University of Central Oklahoma)

***MOLECULAR MECHANISMS OF CARDIAC TERATOGENICITY IN AVIAN MATERNAL PKU**

Maternal PKU is a disease that affects embryos exposed to high levels of Phenylalanine (Phe) from mothers with PKU. This results in severe cardiac and cranial defects. It is not known which genes in the developing embryo are differently expressed in the presence of high Phe. Fertilized chicken eggs were treated with PHE through yolk injection and incubated until HH10-12-14 and then dissected. RNA was isolated from 3 thoracic samples of Control or Phe treated for each timepoint. RNA was shipped to Applied Biological Materials for enrichment for mRNA, library construction, and sequencing on the Illumina NextSeq500. Data was analyzed with the open source software Galaxy Suite. Resulting Differentially expressed genes were analyzed using DAVID for enriched signaling pathways. Two pathways, Retinoid (RA) and Focal Adhesion (FA), were significantly enriched. In review of the literature RA signaling is important in heart development and increases or decreases in levels of RA can cause significant developmental defects. Additionally, FA signaling effects cell behaviors including cell motility, proliferation, and survival. Further experiments, including Quantitative PCR (QPCR), in-situ hybridization, and immunohistochemistry are underway.

Clark, Kennedy Daphnee Patrom-Jones, and Alisha Howard (East Central University)

***BOVINE LEUKEMIA VIRUS IN DAIRY MILK**

Bovine Leukemia Virus (BLV) is an infection in cattle more commonly identified in large dairy herds. Presence of BLV particles in human breast tissues has been found to be correlated to breast cancer incidence in humans. Prevalence of BLV infection, or even presence of virus/particles in dairy milk, has not yet been established. Although, large scale studies have identified BLV infection in large herds throughout the US midwest. If this virus is linked to breast cancer, there are several modes of causation to consider. The viral particles remaining after the pasteurization process could act as a pro-inflammatory molecule or less likely BLV could act zoonotically. A protocol checking for BLV proteins in the dairy milk will allow studies to investigate both the prevalence and impact of this virus. First, a plasmid containing the entire BLV genome was obtained from University of California, Berkeley. The sequence was confirmed using restriction digestion. Next, primers were designed with restriction enzyme sites in 5' adapters to facilitate directional cloning of the coding sequence into bacterial expression plasmids. This sequence was confirmed and expression tests were conducted to find the recombinant plasmids that will be used to generate diagnostic positive controls for western blots. Samples obtained from dairy farms will then be compared to these controls to identify prevalence and simultaneously analyzed using qPCR assays.

Coyner, Brandi, Janet K. Braun, and Hayley C. Lanier (Sam Noble Museum)

SURVEY OF THE DISTRIBUTION, HABITAT, AND CURRENT AND HISTORICAL PRESENCE OF WHITE-NOSE SYNDROME IN THE TRI-COLORED BAT IN OKLAHOMA: YEAR 1

The tri-colored bat, *Perimyotis subflavus*, is a Tier II species of greatest conservation need, as identified in the Oklahoma Comprehensive Wildlife Conservation Strategy, and it is one of 12 species that have been confirmed with white-nose syndrome, which is caused by the fungus *Pseudogymnoascus destructans* (Pd). In 2015, three *P. subflavus* were the first to test positive for the fungus in the state, and a positive sample from a *P. subflavus* from Woodward County was the first in the state outside of extreme eastern Oklahoma. The species is considered to be distributed in all but the Panhandle part of the state, but it has only been documented in 31 counties. In this project, we are using acoustic detectors and mist netting surveys to document the presence or absence of *P. subflavus* in the western 2/3rds of the body of Oklahoma where the least is known about the species. To date, acoustic data has been obtained for 13 species from 9 localities in 7 counties, netting has been conducted at 17 localities in 5 counties, and 14 bats of 4 species collected or found in 2019 and 308 museum skins of *P. subflavus* collected prior to 2019 in Oklahoma were swabbed and tested for the presence of Pd. Results of acoustic analysis, netting surveys, and Pd testing will be presented.

DeCelle, Eleanor Brooke Wiens, Clinton Agu, and Christina Henderickson (University of Central Oklahoma)

***DANDELION EXTRACT'S INHIBITORY EFFECT ON HELA CELLS' MIGRATION**

We are studying the effects on cancerous cells using dandelion extract. The cells have shown signs that dandelion extract can halt proliferation, and there have been studies to suggest that dandelion could even kill the cancerous growth. We aim to confirm this hypothesis.

Deleon-Wright, Jaely (University of Central Oklahoma)

****LET'S CHECK YOU OUT: ARE YOU REALLY DOWN WITH DIVERSITY?**

In United States today, the presence of people of color is becoming more of a common sight, which influences academic communities. There is more diversity in the classroom and in the work-place. While this true, often times diversity is not enough for people of color feel included, and like they have someone to relate to. There are several universities across the country that are attempting to implement multicultural diversity messages, while others are attempting to implement a color-blind ideology. A color-blind ideology states that people of color are not unique, but instead everyone is treated the same regardless of the color of their skin. With a multicultural diversity message in place, diversity and inclusiveness is emphasized, possibly allowing people of color to feel more included. The purpose of this study is to investigate how colorblind and multicultural diversity messages influence the behavior, academic performance, and impressions of undergraduate students. In order to support our hypothesis, we will gather students from the University of Central Oklahoma and have them complete the study online via Qualtrics. Participants will either be in the multicultural university or color-blind ideology university group. Depending on the group, participants will either view a diverse university message or a university with a color-blind ideology. Participants will be presented with several questionnaires such as Rosenberg's Self-Esteem scale, Hope scale, and the Locus of Control scale. They will also be completing sample SAT questions to test their academic performance. The results of this study could have implications that could help universities understand the everyday struggles of students of color and different ways that they could be of assistance to these populations.

Dempsey, Erin, Sanam Kadel, Rita Ghale, Karuna Devkota, Charlie Biles, and Alisha Howard (East Central University)

***CHARACTERIZATION OF *DIAPORTHE* SPECIES IMPORTED ON GUATEMALA CANTALOUPE**

Melons (Cantaloupe; *Cucumis melo* var. *cantaloupensis*) were purchased from local grocers in 2016 through 2019 and observed for post-harvest diseases. Of the 80 melons purchased in 2019, 75% developed fruit rot symptoms caused by fungi. The diseased tissue indicated that the majority of lesions were caused by *Diaporthe* spp. (syn; *Phomopsis*), and to a lesser extent lesions were caused by *Alternaria* and *Fusarium* spp. Plant pathogens such as *Diaporthe* spp. enter the surface of the melon fruit early in development and remain latent until fruit maturity. While ripe fruit is harvested and imported with no external evidence of disease, internal fruit rot becomes evident as the fruit matures. The objective of this study was to characterize *Diaporthe* spp. imported in Guatemalan melons. Fungal isolates were characterized based on culture growth characteristics, spore morphology, and DNA analysis. Guatemalan isolates were morphologically similar to *D. sojae* and *D. curcubitae*. Deoxyribonucleic acid (DNA) was extracted from fungal hyphae and purified polymerase chain reactions (PCR) products were Eurofin, Inc. for sequencing. Sequencing analysis demonstrated that some of the isolates were a match for *D. pterocarpi* and species within the *D. arecae* complex. Our finding of pathogenic *Diaporthe* spp.

suggest that plant pathogens are carried across international borders and imported into the United States. Further analysis is being conducted on the melons collected in 2018 and 2019.

Deng, Cuishan, Yongzhi Pan, Norbu Gurung, and H. George Wang (East Central University)

***THE DIFFERENCE IN LEAF-TYING CATERPILLAR COMMUNITIES BETWEEN FOREST EDGE AND INTERIOR HABITATS**

Arthropod community patterns in forest habitats can be influenced by edge effects. We conducted an experiment at the Nature Conservancy's Pontotoc Ridge Preserve to investigate the potential edge effect on leaf shelter building caterpillars and their inquilines. We set up artificial leaf ties on red oak (*Quercus rubra*) trees in both edge and interior habitats of a forest and monitored the arthropod communities in them for two seasons. We compared the Simpson's Diversity Index of all arthropods between the two habitats using linear mixed-effects modeling. We also compared the arthropod alpha diversity between the two habitats using Poisson regression. There was no difference for either metrics between forest edge and interior habitats. We then compared the densities of caterpillars between the two habitats and found a higher abundance of the larvae on trees along forest edges.

Determann II, Brenden Ashlee Hawkins, Benjamin Nelson, and Karen L. Wozniak (Oklahoma State University)

PULMONARY DENDRITIC CELL SUBSET INTERACTIONS WITH *CRYPTOCOCCUS NEOFORMANS

Cryptococcus neoformans, an opportunistic fungal pathogen acquired from the environment, is the known causative agent of cryptococcal meningitis. *C. neoformans* predominantly causes disease in immune compromised individuals resulting in over 180,000 annual deaths from HIV/AIDS infections. Innate phagocytes are proficient in killing *C. neoformans* upon infection however, *C. neoformans* can evade killing and replicate intracellularly. This intracellular survival and replication are thought to be a mechanism for dissemination of *C. neoformans* from the lung to the brain causing a cryptococcal meningitis infection. Dendritic cells (DCs) are phagocytes and antigen presenting cells whose stimulation results in the activation of T lymphocytes. Previous studies using bone marrow-derived DCs showed that DCs can kill *C. neoformans* in vitro, and DCs are recruited to the lungs during cryptococcal infection. Recent studies have shown that within the murine lung, there are two distinct subsets of conventional dendritic cells: CD11b+ and CD103+. We hypothesize that these DC subsets have different interactions with *C. neoformans*. For these studies, we purified DC subsets from murine lung tissue and conducted flow cytometric analysis to analyze DC-cryptococcal interaction. Flow cytometry revealed the presence of the two distinct subsets as well as successful interaction of each DC subset with *C. neoformans*. Antifungal assays showed that neither DC subset has antifungal activity. Further studies will examine the intracellular morphology following uptake of *C. neoformans* by each DC subset by confocal microscopy and imaging flow cytometry, and RNA-sequencing will be performed to identify DC genes involved in this interaction. Understanding the various mechanisms by which DCs can eliminate *C. neoformans* or mechanisms by which the fungal pathogen evades immune clearance will aid in the development of new therapeutic strategies against cryptococcal meningitis.

Dohmen, Rosalie, Biraj B. Kayastha, and Marianna A. Patrauchan (Oklahoma State University)

****SEQUENCE CONSERVATION OF THE NOVEL CALCIUM SENSOR IN *PSEUDOMONAS AERUGINOSA***

Pseudomonas aeruginosa is an opportunistic pathogen that causes acute and chronic infections. It is known to colonize the lungs of Cystic Fibrosis (CF) patients. CF is associated with elevated levels of calcium (Ca²⁺). Previously, we have shown that the elevated levels of Ca²⁺ enhance *P. aeruginosa* virulence. In our attempts to identify a protein that recognizes Ca²⁺ and mediates the response, we predicted a novel Ca²⁺ sensor encoded by PA4107. We named it EfhP after its two canonical EF-hands and showed that it binds Ca²⁺. We also showed that it mediates the Ca²⁺ regulation of *P. aeruginosa* virulence. Considering the putative role of EfhP as a Ca²⁺-sensor, we hypothesized it to be conserved among pseudomonads. To test this, we applied bioinformatics and compared sequences of efhP homologs from all *Pseudomonas* species that are available in public databases. We determined that EfhP homologs were present mostly in *P. aeruginosa* and shared 77-100% amino acid sequence identity. This specificity was verified by PCR tests using specific efhP primers in a variety of bacterial genera and species. When studying sequence conservation within EF-hand and putative target-recognizing domains, we identified several "hotspots" with increased frequency of mutations mostly occurring in the N-terminus of the protein upstream of the EF hand domain. Overall, we observed no correlation between efhP sequence conservation and the sources of strain isolation. To test whether efhP sequence is conserved during infections, we amplified the homologs of efhP from clinical isolates collected from CF patients of different ages as well as from keratitis infections. The on-going analyses aim to correlate the occurrence of mutations and severity of infections. This will help establish the importance of EfhP in the adaptation of *P. aeruginosa* to the hostile host environment and the role of Ca²⁺ signaling in this process.

Donson, Taryn and Vickie M. Jean (University of Central Oklahoma)

***THE RELATIONSHIP BETWEEN ADVERSE CHILDHOOD EXPERIENCES, SHAME AND BEHAVIORAL INHIBITION AND AVOIDANCE**

This present study seeks to examine the relationship between adverse childhood experiences (ACES), behavioral inhibition and avoidance, and trauma-related. Adverse childhood experiences (ACES) is operationally defined as a traumatic event or a series of traumatic events that occur prior to the age of eighteen. Individuals who have experienced more ACES or traumatic experiences in childhood are more susceptible to the development of depression, anxiety, substance misuse, and other mental and physical health complications. ACES includes, but is not limited to physical, sexual, and emotional abuse and neglect, divorce or parental separation, domestic violence, etc. Trauma-related shame is a maladaptive emotion, not to be confused with guilt. It is a negative evaluation of an individual's entire self-construct due to the experience of trauma. Behavioral Inhibition/Avoidance is a two system theory of motivation. The function of behavioral inhibition is to regulate appetitive, pleasurable stimuli. The function of behavioral avoidance is to regulate aversive, unpleasant stimuli. The BIS/BAS scale exists to assess the sensitivity between these two systems. The researcher predicts that there will be a strong, positive correlation between ACES and trauma-related shame; and the more adverse childhood

experiences the participant has, the higher their trauma-related shame will be. There will be a moderate negative correlation between Behavioral Avoidance and ACES. Meaning that the higher the ACE score, the lower the behavioral avoidance drive. The higher the score on the shame scale, the higher the behavioral inhibition drive will be. Unfortunately, trauma is becoming increasingly evident in today's society. The goal of conducting this study is to use the scientific method to further expand the literature on psychological trauma in relation to adverse childhood experiences and how individuals affected by trauma may be motivated, as well as expand on the topic of shame, which is under-researched in psychological literature.

Dudley, Leah S. (East Central University)

MILKWEED AS AN INDICATOR SPECIES

Milkweed is a trendy plant for those generally concerned with the continued persistence of our charismatic species, especially that of the monarch butterfly. Efforts to sustain healthy populations of monarchs have focused on planting milkweeds and creating "butterfly gardens". While these efforts should be commended, the planting of milkweed may have further reaching beneficial effects than solely supporting monarchs through nectar production and forage for caterpillar development. Our study aims to examine native milkweed and assess use by other organisms such as native bees, beetles, and butterflies (including, but not limited to monarchs). We also examine whether this use may be impacted by environment, using plant water availability as an abiotic effect. We sampled two milkweed species, *Asclepias tuberosa* (within one site) and *A. viridis* (across three sites). All visitors during a 15min interval were recorded and behavior during the visit was noted. Herbivore damage was further assessed by collecting leaves at fruit senescence from plants that had been observed during flowering. Finally, the plant water availability for each site was assessed using predawn water potentials of a co-occurring species, *Rubus trivialis*. We found that bigger plants but not greater floral display impacted visitation frequency. We found that on average, during milkweed flowering, *R. trivialis* had greater water potential compared to when milkweed fruit were senescing. We found a positive correlation between site *R. trivialis* water availability and milkweed visitation frequency. Our results suggest that milkweed would be beneficial to many other species beyond the monarch and that this would depend on overall site quality so that more moist sites could possibly support more individuals that use milkweed as a resource.

Espinosa, Kyle, Nathan Wickware, Nathaniel Ashley, and Nesreen Alsou (University of Central Oklahoma)

*MICROWAVE IMAGING SYSTEM

In the field of medical imaging, there are many ways to visualize disease pathology in the body. Conventional medical imaging techniques use ionizing radiation, which is harmful to the patient on a cellular level. As more and more imaging tests are being ordered, safer alternatives must be developed to protect the public from these harmful effects. Microwave imaging is a novel solution that will produce images while keeping the patient safe from harmful radiation. Lower frequency microwaves are not as harmful to DNA and cellular structures. As a result, a microwave imaging system will be safer for method to acquire medical images. Although this technology has been actively researched for several decades, the proposed design differs in that it will attempt to merge the circular data collection patterns of computed tomography and MRI with the reflective nature of radar and ultrasound. As a result, the system will be able to produce 3D images of the anatomy in a much safer manner. Future work would include using variable frequency microwave production, smaller detection and emitting components to improve resolution, and increasing the scale of the design to facilitate a larger test specimen.

Fenwick, Allyson, Samah Houmam, Briant Nguyen, Laura Kimmel, Susan McKenna, Mari Nguyen, and Madison Birdwell (University of Central Oklahoma)

MEDITERRANEAN GECKOS (*HEMIDACTYLUS TURCICUS*) AT THE UNIVERSITY OF CENTRAL OKLAHOMA ARE FOUND OUTSIDE IN WINTER

The Mediterranean gecko (*Hemidactylus turcicus*) is a small nocturnal lizard native to rocky cliffs in the Middle East but has spread worldwide through human introductions. Central Oklahoma is near the northern edge of the known U.S. range and at the northern edge of the predicted range based on climate. Individuals are only expected to be active during the frost-free period of May through October. Several years of spring surveys by an introductory UCO biology course found geckos active in January. A small team of trained student researchers have been collecting gecko observations, temperatures, and other data since September 2018. We found geckos throughout the winter, including some sightings at temperature below the measure critical thermal minimum temperature. Patterns are similar across two buildings – the original site of introduction and one near the outer edge of the UCO range. Individuals are not choosing perches that are warmer than nearby wall areas, supporting previous studies suggesting they are poor behavioral thermoregulators.

Fishbein, Mark¹, Peter Fritsch², Bruce W. Hoagland³, Abigail J. Moore³, Danie Spalink⁴, and George A. Yatskievych⁵ (¹Oklahoma State University; ²Botanical Research Institute of Texas; ³University of Oklahoma; ⁴Texas A&M University; ⁵University of Texas at Austin)

AMERICAN CROSSROADS: DIGITIZING THE VASCULAR FLORA OF THE SOUTH-CENTRAL UNITED STATES

Though one of the ecologically most diverse and species rich regions of the United States, Oklahoma and Texas are not well represented in digitized herbarium databases. The region is home to 17 Level-III ecoregions and nearly 5000 native vascular plant species. The diversity of the region is driven by its position as a crossroads—between the subtropic and temperate zones and between the forests of the east and the grasslands and deserts of the west. The region sits on a steep precipitation gradient, dropping from > 150 cm/yr on the Gulf Coastal Plain to < 12.5 cm/yr in the Chihuahuan Desert. Thus, access to digitized herbarium data for the region will be crucial for monitoring and projecting changes in species ranges and reorganization of vegetation in response to ongoing climate change, as well as other anthropogenic impacts on the region's biota. The Texas Oklahoma Regional Consortium of Herbaria (TORCH) is a collaborative effort among >40 herbaria in these two states to fully digitize (database, image, georeference) vascular plant specimens collected in Texas and Oklahoma. In collaboration with external partners at Harvard University, Missouri Botanical Garden, New York Botanical Garden, Smithsonian Institution, University of Kansas, and University of Arkansas, the NSF-funded

TORCH Thematic Collections Network will digitize nearly 2 million vascular plants specimens over the next four years. This effort will fill one of the largest gaps in knowledge about vascular plant occurrences in the United States and will enable a multiplicity of research projects concerning species and vegetation responses to climate change.

Gerstenberger, Peter^{1,2}, Patrick Allaire², Scott Hebbring², and Celestino Velasquez¹ (¹Oral Roberts University; ² Marshfield Clinic Research Institute, Center for Human Genetics, Marshfield, WI)

***CORRELATING TELOMERE LENGTH WITH DISEASES AND NOVEL GENETIC VARIANTS**

Telomeres are the repetitive non-coding short DNA segments that cap chromosome ends and function to protect vital genetic information. Telomere length correlates directly with the proliferative capacity of the parent cell, shortening by approximately 10 base pairs per replication cycle. When telomeres become too short, the DNA damage-response signaling pathway is triggered, causing cellular senescence. Shortened telomeres are associated with many age-related diseases as well as inheritance-related disorders, including type II diabetes and cancer. The goal of this project included two objectives: 1) find new associations between telomere length (TL) and various diseases via a Phenome-Wide Association Study (PheWAS), and 2) discover associations between TL and genetic variants via a Genome-Wide Association Study (GWAS). All genetic samples from the Personalized Medicine Research Project (PMRP) Biobank (includes ~20,000 patients) were genotyped to determine the relative average telomere length (raTL) using quantitative PCR, and then compared to each patient's electronic health record, containing codes for 8,989 phenotypic diseases (PheWAS). The telomere data was then correlated with over 8 million genomic single nucleotide polymorphisms (SNPs) to define associations between TL and genetic variants (GWAS). Preliminary results from the PheWAS show correlations between telomere length and conditions including atherosclerosis, heart disease, obesity, presbyopia, bronchitis, and diabetes. The strongest preliminary association signals in the GWAS were among variants already known to be linked with TL, including the genes RTEL1, TERC, and TERT. This tells us that our initial GWAS analysis was successful, and other discovered associations can be trusted. We successfully found phenotypic diseases and genetic variants associated with telomere length. The remaining data is still in process of being cleaned, adjusted, and associated with the correct health records, but preliminary data is promising. Follow-up studies will be performed to implement a PheWAS of the TL-associated SNPs.

Ghale, Rita Kabu Dangol, Sanam Kadel, Leah Dudley, and Charlie Biles (East Central University)

***THE EFFECT OF SALINITY AND LIGHT ON REPRODUCTIVE STRUCTURES OF *DIAPORTHE* SP., A PLANT PATHOGENIC FUNGI**

With hypersaline soils covering up to 27% of the earth's land surface, high salinity represents a major detrimental factor in crop production. Many researchers have proposed using bacteria and fungi to reduce drought and salt stress in crop plants. Fungi are among the most tolerant microbes to water stress. *Diaporthe* sp. are pathogens on several plant hosts. They produce asexual reproductive structures called pycnidia, which in turn, synthesize conidiospores. The conidiospores are released from the pycnidia and infect susceptible plants. The purpose of this research was to determine if various salt (NaCl) levels would be detrimental to pycnidia production. A second objective was to determine if light is a factor in pycnidia production as well. Our null hypothesis was that light and salt levels have a neutral effect on reproductive structure synthesis. Experiments were conducted in which the pathogen was grown on alfalfa stems on water agar. Results indicated that light enhances pycnidia production, and high levels of salt inhibit growth of the fungus and also reproductive structures. *Diaporthe* sp. do not appear to be salt tolerant. This information may be helpful in determining whether till or no-till farming practices may be more useful in controlling this pathogen. Also, saline soils will probably support a smaller population of *Diaporthe* sp.

Giemza, Amy Gaelle Mihigo, Susane Mihigo, and Lindsey J. Long (Oklahoma Christian University)

***ANALYSIS OF UNCHARACTERIZED PROTEIN 3H04**

Enzymes are proteins that catalyze chemical reactions necessary to support life. In order to better understand how organisms function, it is important to study the enzymes that play a role in cellular processes. The goal of this study was to determine the function of the uncharacterized enzyme, 3H04. Because enzyme function is heavily influenced by the structure of the enzyme, bioinformatic tools were used to compare 3H04 with other enzymes with known functions that have homologous active sites, sequences, and three-dimensional structures. This information was used to formulate the hypothesis that 3H04 was an alpha/beta hydrolase. To test the hypothesis, the DNA of 3H04 was expressed and purified for use in in vitro enzymatic assays with various hydrolase substrates. Enzymatic activity was seen with a common ester substrate for hydrolases, but not with common lipid or carbohydrate substrates. Altogether, the in vitro results supported the hypothesis formulated by the bioinformatic tools, that 3H04 has hydrolytic function. The purification and enzyme assays for 3H04 should be repeated in the future within a smaller time period to identify whether potential degradation of the enzyme plays a factor in the results of the experiment.

Greenwood, Augustus and Amanda J. Nichols (Oklahoma Christian University)

***THE CHEMICAL AND MECHANICAL NATURE OF BIOGELS**

Numerous chemistry experiments have been developed for the undergraduate laboratory to introduce students to the world of polymers including the link between the chemical and mechanical properties of biogels. One polymer is alginate, a biocompatible gel that holds application for many different areas, one being drug delivery. It possesses low toxicity, has a relatively low cost, and shows promise for observable increased durability. Alginate is not durable typically, and its use decreases when time and strain are considered; however, methods developed increased its strength, mainly cross-linkage with calcium. With increasing concentrations of Ca²⁺, the gel's durability and resistance to release increased. Differing ions and other chemicals such as chitosan can provide the necessary extra structure to allow for extended drug release or resistance to strain. Methods to measure the kinetics of drug delivery was developed by complexing the gel with food coloring or salicylic acid. The mechanical properties of alginate gels can be compared to other common polymers, such as agar, glycerol, and starch. First-year, undergraduate chemistry students could not only be allowed to make polymers,

but they also can see how those substances are tested and characterized by mechanical engineering students. A direct link between the chemistry in synthesizing the gels and their mechanical properties can be established.

Harrington, Ebony (University of Central Oklahoma)

****YOU LOVE YOURSELF ENOUGH FOR US BOTH: PERCEPTIONS OF NARCISSISTIC PARTNERS AND RELATIONSHIP OUTCOMES**

112 students currently in romantic relationships attending a large regional university participated in a research study for the chance to win a \$25 Amazon gift card. After clicking a link received in an e-mail blast to students enrolled in Summer 2018 classes, participants completed measures of relationship satisfaction (the Relationship Assessment Scale; Hendrick, 1988), relationship investment (the Investment Model Scale; Rusbult, Martz, & Agnew, 1998), self-esteem (the Rosenberg Self-Esteem Scale; Rosenberg, 1965), and perceptions of both their own and their partners' narcissistic personality traits (the Narcissistic Personality Inventory; Raskin & Terry, 1988). Participants also provided information about their relationships, including the number of days (of the past 30) in which they engaged in affectionate touch and sexual activity with their partners. Results indicate that perceptions of partners' personality traits (but not of own) predict satisfaction (both from the RAS and the IMS) and commitment (from the IMS) in romantic relationships, such that as perceptions of partners' narcissistic traits increased, satisfaction and commitment decreased. However, these perceptions did not predict thoughts about the quality/availability of relationship alternatives or investment in relationships, nor did the perceptions predict affectionate or sexual behaviors reported by participants. Discussion focuses on the practical implications of these findings, both for the self-concept as well as relationship functioning.

Harris, Dominique (University of Central Oklahoma)

***HOOK-UP CULTURE IN MINORITIES, FACTORS, AND EFFECTS**

Studying the effects hookup culture has on minorities, comparing these effects to the major findings of literature on 'hook-up culture' which focus primarily on white heterosexual college aged adults. Literature has shown that students of color are less likely to participate in hookup culture than their Caucasian counterparts. However, this study will focus only on students of color, identifying if there truly is a lower hookup frequency or if there is not enough research. Defining what makes 'hook-up culture' into a culture rather than an experience. Analyzing possible factors that contribute to this phenomenon such as generational changes in sexual experience, culture, technology and attitudes towards hooking up relate to hookup frequency, and the expanse of hookup culture into what it is today. Defining the sexual script that hookup culture has created within itself for both students of color and Caucasian students, comparing and contrasting them, studying how this script affects monogamous relationships. Gathering data to theorize where this culture came from, when it started and the discrete factors that move alongside it. Finally using the data collected and research on past trends to hypothesize the future of hookup culture, and casual sex and how it may be affecting youths mentally, as well as their perceptions of relationships. Ideally, this study will provide more information for minority students to feel involved in the college experience, which has entwined itself with 'hookup-culture' in such a way that is sang about in pop culture media, provide data on the different effects minorities may have compared to the effects Caucasian students have reported in known literature.

Harris, Kelsie (University of Central Oklahoma)

***CHILDHOOD SEXUAL TRAUMA: EFFECTS ON THE DEVELOPMENT OF GENDER AND SEXUAL IDENTITY**

This research focuses on the prevalence of childhood sexual trauma and the importance of understanding how it affects the development of gender identity and sexual identity through adolescence and into adulthood. My presentation also focuses on my hopes for future research endeavors into this topic as my research is in its early stages. In large part my research shows that much of the differences in how childhood sexual trauma effects the development of gender and sexual identity is based on if the perpetrator is the same sex or the opposite sex as the victim/survivor. For instance, males with same-sex abusers face stronger conflicts with their gender and sexual identity than males with opposite sex abusers. Females however tend to develop more conflicts with their gender and sexual identity if they have opposite sex abusers. For instance females with opposite sex abusers tend to develop a more masculinized gender expression, and this is theorized to be a means of protection against further abuse. Females with opposite sex abusers also tend to develop a sexual fear of men in adulthood, and if heterosexual this would conflict with their sexual identity. Further research is needed into how childhood sexual trauma inflicted by same-sex and opposite sex abusers effect the development of gender and sexual identity is needed to understand the full implications. Understanding the prevalence and the effects on victims/survivors will ultimately push for further research and advocacy around the issue.

Hawkins, Ashlee, Brenden Determann, Benjamin Nelson, and Karen L. Wozniak (Oklahoma State University)

****ANALYSIS OF THE INTERACTIONS BETWEEN *CRYPTOCOCCUS NEOFORMANS* AND PULMONARY MACROPHAGE SUBSETS**

With over 220,000 cases and 180,000 deaths annually, *Cryptococcus neoformans* is the most common cause of fungal meningitis and a leading cause of death in HIV/AIDS patients in Sub-Saharan Africa. *C. neoformans* can either be killed by innate airway phagocytes, or it can survive within pulmonary macrophages. Pulmonary macrophage subsets have been identified, and we hypothesize that each subset has different interactions with *C. neoformans*. For these studies, we purified murine pulmonary macrophage subsets – alveolar macrophages, Ly6C- and Ly6C+ monocyte-like macrophages, and interstitial macrophages. With each subset, we examined cryptococcal association, intracellular fungal morphology, and antifungal activity. Results showed that all subsets associate with *C. neoformans*, but only monocyte-like macrophages inhibited growth. In addition, we observed sex differences in antifungal activity - the male Ly6C+ monocyte-like macrophages inhibited cryptococcal growth, while the female Ly6C- monocyte-like macrophages inhibited cryptococcal growth. Future studies will use RNA-sequencing to determine the genes up- or down-regulated in antifungal vs permissive subsets, live confocal microscopy to visualize intracellular cryptococcal morphology, imaging flow cytometry to quantify uptake, and cytokine analysis to determine differential cytokine production by each subset following interaction with *C. neoformans*.

Understanding the mechanisms that macrophages use for antifungal activity as well as host genes and pathways affected in permissive macrophages can serve as key targets when developing therapeutic strategies to prevent cryptococcal meningitis.

Haynie, Michelle L.¹, Francisca M. Mendez-Harclerode², Gloria M. Caddell¹, and Chad B. King¹ (¹University of Central Oklahoma; ²Bethel College)

PRELIMINARY TRENDS IN SMALL MAMMAL POPULATIONS AFTER TWO YEARS OF MARK-RECAPTURE RESEARCH IN THE GYPSUM HILLS OF WESTERN OKLAHOMA

The purpose of this project is to monitor changes in small mammal populations and communities over multiple generations to determine what factors affect how the populations and communities change over time. In March of 2018, a permanent trapping web was established at the University of Central Oklahoma's Selman Living Lab (SLL). Two additional permanent webs were established in June of 2018. The SLL is located in the gypsum hills of Woodward County in western Oklahoma. Surveys of the 3 webs are conducted for 3 nights, 4 times a year, and include collection of mammalian and vegetation data. Climate data also is obtained for each day of the trip; monthly and yearly climate data also will be assessed. To date, 7 mammalian and vegetation surveys have been conducted. Based on preliminary data, seasonal and habitat trends have been detected in mammalian populations, with the lowest capture numbers occurring in the summer and reaching peak numbers in the spring. The trapping web located on mixed, slightly disturbed habitat has the most diverse community and the most number of captures/recaptures. Preliminary vegetation data shows seasonal and yearly trends. In the future, the animal, climate, and vegetation data will be used to build mathematical models that can be used to determine which factors have the largest impact on population and community persistence. Additionally, changes in the genomic make-up of the populations over time will be assessed.

Hefley, Brenna, Samantha Perry, and April Nesbit (East Central University)

*STUDYING YfAX IN *ESCHERICHIA COLI*

Even though *Escherichia coli* has been studied for over 100 years, the function of some proteins in *E. coli*, including YfaX, are still unknown. YfaX protein is predicted to be a transcription factor, and it is the first gene in the yfaXWVU operon. It has been suggested that other proteins in this operon interact with rhammonate in vitro. Therefore, we tested the ability of *E. coli* to metabolize rhammonate in vivo. We observed that *E. coli* cannot grow under aerobic in the presence of rhammonate. Due to the inability of *E. coli* to metabolize rhammonate in vivo, we looked at other possible sugars to interact with this operon. One sugar that was mentioned in the in vitro study was lyxonate, which is not commercially available, plays a role in vitro. In the place of lyxonate, we used ascorbate, which is predicted to degrade to lyxonate in the human intestines where *E. coli* often grows. We performed growth curves with ascorbate and found that *E. coli* could grow slowly with ascorbate only under anaerobic conditions. To test the effect on the yfaXWVU operon, we ran gene expression assays and discovered that yfaX promoter expression increased three-fold in the presence of ascorbate compared to glucose. However, there was no difference in gene expression with or without YfaX under conditions tested, indicating that YfaX does not act as a transcription factor to regulate the yfaX promoter. Furthermore, expression was increased in ascorbate compared to glycerol, suggesting that there is an ascorbate-specific response separate from catabolic repression. Based on these studies, we cannot determine whether YfaX is a transcription factor, but ascorbate does play a role in yfaX gene expression.

Hendrickson, Christina, Melville B. Vaughan, Chigozie Agu, Brooke Wiens, and Eleanore DeCelle (University of Central Oklahoma)

INVESTIGATION OF ANTI-PROLIFERATION AND ANTI-INVASIVE EFFECTS OF *TARAXACUM OFFICINALE* ON HELA CELLS

Purpose: According to International Agency for Research on Cancer, cervical cancer was the second most commonly diagnosed cancer in women in low and medium-HDI countries in 2018. It was the fourth-leading cause of cancer death in women worldwide. Despite of the development of many novel cancer therapies, there is still a high rate of therapy failure and mortality among patients. Natural health products like herbal extracts have attracted scientists attention in recent years. This study has investigated the anti-carcinogenic and anti-invasive effects of *Taraxacum officinale*, commonly known as Dandelion, on HeLa cells. Method: The HeLa cells were maintained under standard conditions. Aqueous dandelion root extract (DRE) and Dandelion Whole Extract (DWE) were prepared and lyophilized. Both lyophilized extracts resuspended in DMEM, supplemented with 5% fetal bovine serum (FBS) and 1% antibiotic-antimycotic to make the concentrations of 20, 10, and 5 mg/mL. HeLa cells were treated with concentrations of 20, 10, 5 and , and 0 mg/mL of DRE and DWE for 96 hours prior to being assessed by proliferation test via Click-iT Edu kit. The effect of Dandelion extracts on HeLa cells' invasion was assessed by migration assay after growing the cells for 72 hours. Cell migration was checked after 24 and 48 hours. Result: HeLa cells proliferation was inhibited by Traxacum Officinale extracts in a manner dependent of extracts doses. However, DWE extract was more effective in inhibiting HeLa cells proliferation. DWE inhibited HeLa cells migration in a manner of extract doses following the migration assay. DRE was less effective in terms of cell migration inhibition. Conclusion: This study supports the effectiveness of Traxacum Officinale as a source of natural anti-carcinogenic compounds. However, Dandelion whole plant extract is more effective against HeLa cells compared to the root extract only.

Hernandez, Emily and Greg Mullen (Oklahoma City University)

*READERS DIGEST: MYCOBACTERIOPHAGE AND YOU

Drug Resistant Tuberculosis (TB) is a worldwide health crisis. According to the World Health Organization, ~240,000 people died from drug resistant TB in 2016. In response to this global emergency, new methods of treatment are being developed and tested, one of which uses mycobacteriophage. Mycobacteriophage (phage) are viruses that specifically infect mycobacteria such as *Mycobacterium tuberculosis*. This form of therapy will use combinations of phage to avoid issues with resistance, which calls for identification of unique types of phage that enter the bacteria through different pathways. I have isolated phage that are capable of infecting all mycobacterium strains tested to date. I am currently cloning and sequencing the genomes of the phage to determine their relationships

to existing phage. I have also isolated phage resistant mutants in *M. smegmatis* and *M. phlei*; three of these mutants are completely resistant to phage infection and the remaining five isolates have reduced susceptibility to infection or delayed phage maturation. I am going to use whole genome sequencing to identify candidate mutations in these resistant strains. I will also test phage isolated in other laboratories for their ability to infect the resistant mutants. My goal is to identify genes required for phage resistance and to develop a simple assay to determine which phage can be usefully combined for phage therapy.

Hickey, Kaitlyn and Billi Bobala (University of Central Oklahoma)

***IDENTIFICATION OF *PANTHERA* MTDNA AND REMOVAL OF PSEUDOGENE**

For wildlife forensics, it is important for scientists to genetically identify what animal is being poached to provide evidence in apprehending these offenders. However, a common problem when performing DNA analysis on members of the genus *Panthera* is that mtDNA is often found as pseudogenes in the nuclear DNA. These numts can make it difficult to correctly identify molecular evidence collected from wildlife crimes. A common process used in forensic wildlife DNA examination is diluting the sample so that what is amplified and sequenced only contains mtDNA. Since there are so many copies of mtDNA in every cell, this should theoretically eliminate some of the numt contamination. This is problematic when using a small sample size due to the risk of over dilution and being unable to generate a usable profile. Exonuclease V is an enzyme that will digest linear nuclear DNA and leave only circular mtDNA intact. We designed primers for Panthera genus mtDNA analysis that would allow amplification of the cyt b gene on the mtDNA. We found nuclear primers for the β -fibrinogen intron 7 gene to identify the linear pseudogene and confirm its digestion. We then used Exonuclease V and digested the numt, leaving only the uncontaminated mtDNA in solution. We confirmed Exonuclease V's effectiveness by creating nuclear DNA primers and running a separate gel electrophoresis to show the absence of amplified nuclear DNA.

Husak, Michael S. and Diane Roeder (Cameron University)

EFFECTS OF BLOOD SAMPLING ON NESTLING SCISSOR-TAILED FLYCATCHERS (*TYRANNUS FORFICATUS*)

Increases in the ease and efficiency of genetic work in birds using minimally invasive techniques has opened the potential to ask a broad range of ecological questions. As such, blood sampling for adult and nestling birds has increased dramatically over the last 25 years. While sampling protocols are well researched and monitored, there remain questions regarding the effects of blood sampling on survival and development in nestlings, especially in systems in which depredation rates are high. Scissor-tailed Flycatchers (*Tyrannus forficatus*) exhibit low rates of nesting success, largely due to predation. Thus, any field techniques that demonstrate increased negative survivorship or delayed development of young should be minimized for this species. To test the effects of blood sampling, we compared survival, number of fledglings, and rates of development in nestling Scissor-tailed Flycatchers during a 4-year study in which blood samples were collected to determine rates of extra-pair paternity. We found that blood sampling: 1) does not increase predation risk, 2) does not increase nest abandonment by parents, 3) does not reduce proportion of nestlings that fledge, and 4) does not slow development of nestlings.

Iwunze, Ngozi and Brant Smith (Oklahoma Christian University)

GENOME ANNOTATION OF CONTIG 54 IN *DROSOPHILA TAKAHASHII

The purpose of this research was to compare the gene structure of genes on the *Drosophila* 3L chromosome genes on the predominantly heterochromatic dot chromosome. Gene annotation is the process of identifying the exon and intron boundaries of genes using bioinformatic data. The genome of *D. melanogaster* has already been sequenced and annotated, however, the genome of *D. takahashii* has not been annotated. In this project, the annotated genes of *D. melanogaster* were used as a reference to annotate the orthologous genes in *D. takahashii*. Multiple genetic tools were used to annotate the genes of *D. takahashii*. The UCSC genome browser and different BLAST algorithms were used to compare all of the genes in contig54 of *D. takahashii* that significantly aligned with the *D. melanogaster* ortholog. After annotating contig54 it was discovered that both *D. takahashii* and *D. melanogaster* have similar gene isoforms as well as having completely different isoforms. One challenge that occurred while annotating contig54, was that a reading frame for an isoform contained two stop codons. By using the tools in Flybase, and gene model checker it was determined that the first stop codon was skipped, and transcription continued until the second stop codon was reached. In the future when *D. takahashii* has been sequenced and annotated completely, it can be used as a comparison to annotate other closely related fly species within the genus.

Jacob, Nicholas C. (East Central University)

BOOTSTRAPPING: AN OVERVIEW

The bootstrapping re-sampling method is a way to express uncertainty using only the data that has been collected without resorting to assumptions about the underlying distribution. The process can be used on parametric and non-parametric statistics to provide confidence intervals. A connection will be drawn comparing the bootstrapping method to the maximum likelihood estimator.

Johnson, Emily S., Biraj B. Kayastha, and Marianna A. Patrauchan (Oklahoma State University)

CHARACTERIZATION OF CELLULAR LOCALIZATION OF THE CALCIUM (CA²⁺) BINDING EF HAND PROTEIN EFHP AND ITS ABUNDANCE IN RESPONSE TO EXTRACELLULAR CA²⁺ IN *PSEUDOMONAS AERUGINOSA

Pseudomonas aeruginosa is an opportunistic pathogen that infects a large number of people, especially patients with cystic fibrosis and pneumonia. These infections are difficult to treat due to emergence of multidrug resistance. Research in our lab has shown its virulence is enhanced at elevated levels of calcium ion (Ca²⁺). Such increased Ca²⁺ levels are hallmarks of certain human diseases. Though Ca²⁺ signaling has not been well researched in bacteria, there are evidences that Ca²⁺ may act as a secondary messenger in bacteria just like in the eukaryotes. We aim to understand the molecular mechanisms behind this. A protein in *P. aeruginosa* EfhP, which bears similarity to Ca²⁺-sensors in eukaryotes, has two EF-hand domains that bind to Ca²⁺. In order to characterize the role of this protein in

sensing Ca²⁺ and relaying the response, we aim have two distinct aims. The first goal is to determine the subcellular location of EfhP in *P. aeruginosa*. Based on sequence analysis, we hypothesized that EfhP spans the inner membrane, with the EF hands facing the cytoplasm. The hypothesis will be tested by subcellular fractionation of PAO1 and immunoblotting. Polyclonal and secondary antibodies raised against EfhP will be used for detection of EfhP by chemiluminescent imaging. The second goal is to determine the effect of extracellular Ca²⁺ on the expression of EfhP. *P. aeruginosa* will be grown in the presence of different levels of Ca²⁺. Blotting method will be followed as above. Higher EfhP production is expected at elevated levels of Ca²⁺ allowing the cell to detect more Ca²⁺ and cause further increase in the production of virulence factors. Through this the understanding of the function of EfhP will be advanced. This will ultimately help to develop inhibitors that block EfhP function and prevent Ca²⁺ enhancement of *P. aeruginosa* virulence.

Johnson, Ginger and Esra Akbas (East Central University)

***NETWORK EMBEDDING: ON COMPRESSION AND LEARNING**

Recently popular network embedding methods prove promising for various applications; however, it may be difficult to apply these methods to large graphs. To address this, our paper presents the novel method NECL – Network Embedding on Compression and Learning. The goal of this method is to answer if there is an ideal compression of a network and does this have a significant increase in representation learning. We propose a neighborhood similarity based graph compression. By using the compressed graph for network embedding, we can bring down the embedding cost. NECL can improve the efficiency of graph embedding algorithms, including DeepWalk and Node2vec. Experiments on real-world graphs shows an average improvement of 23-57% on embedding time, including walking and learning time, without a decrease of classification accuracy.

Kedy, Cameron, Alyxandra Siemer, Destinee Wilkins, Umar Sahi, and Hari Kotturi (University of Cental Oklahoma)

***ISOLATION OF GORDONIAPHAGES AND MICROBACTERIOPHAGES FROM COMPOST, SOIL, AND WATER SAMPLES**

Bacteriophages are viruses that selectively invade bacterial host cells, seizing control of the enzymatic machinery associated with host replication and subsequently multiplying within the host. Throughout the project, our goals were to isolate, purify and amplify bacteriophages which infect *Microbacterium foliorum* and *Gordonia terrae* from Oklahoma water and soil. Four bacteriophages infecting *M. foliorum* were successfully isolated and have been named Alyxandracam, RayHolt, Jeffords, and Hitchcock. Two bacteriophages infecting *G. terrae* were successfully isolated and have been named Rosa and Scully. Environmental samples were obtained from soil, compost, lake and river water in the Oklahoma City metro area. We used the direct isolation method for isolating the phages and did three rounds of plaque purifications to obtain pure phages. Webbed plates were used for obtaining high titer concentrations above 1.0 x 10⁹ pfu/mL. The genomic DNA of the phages Alyxandracam, RayHolt and Rosa was extracted using the PCI method, and Alyxandracam was imaged using transmission electron microscopy. The genome of Microbacteriophage Alyxandracam has been sequenced using Illumina sequencing technology. Annotation of the Alyxandracam's genome revealed a circularly-permuted, 41,770 bp genome with 63.4% GC content. Alyxandracam belongs to cluster EA and subcluster EA1, and appears to enact a lytic viral cycle. Alyxandracam has 63 genes, 25 of which appear to have known protein function based on BlastP and HHPred comparison. No tRNAs were found, and there did not appear to be a translational frameshift within the tail assembly chaperone genes. The annotated genome of Alyxandracam has been submitted to GenBank with an assigned accession number of MN062713.

Ketchum, Heather, Gautham Gautham, Heather Ketchum, and Eric Bright (University of Oklahoma)

***THE EFFECT OF NICOTINE AND COTININE ON THE DEVELOPMENT OF *COCHLIOMYIA MACELLARIA* (FABRICIUS) (DIPTERA: CALLIPHORIDAE)**

Nicotine, readily available in electronic nicotine delivery systems, poses a lethal threat as it is easily accessible and highly toxic in its liquid form. Seventy-five percent of nicotine is metabolized into cotinine in as little as 20 minutes in the blood plasma and has 10-times longer half-life than nicotine. With the growing prevalence of nicotine-related deaths comes the increased possibility of finding nicotine or cotinine in the tissues of a corpse, which could distort postmortem interval (PMI) estimates. Through entomotoxicology, the study of how drugs and toxins influence the development of insects present on a decomposing body, this study aimed to determine if varying concentrations of nicotine and cotinine affected the development of the forensically important *Cochliomyia macellaria* (Fabricius) [Diptera: Calliphoridae], secondary screwworm. In this study, *C. macellaria* maggots were reared on three different concentrations - 25% (QD), 50% (HD), and 100% (LD) of the lethal dose of nicotine. Knowing 75% of metabolized nicotine is cotinine, we used the 75% of the lethal nicotine dose to calculate the QD, HD and LD concentrations of cotinine. Maggot weights and lengths were determined every twelve hours until post-feeding. This study found that nicotine dosage affected the weight and length of maggots. Maggots reared on untreated liver weighed more and were longer than those maggots reared on liver treated with a lethal dose of nicotine. While there was no effect of cotinine on maggot length and weight, there was a significant difference in the growth rate. These results suggest a negative relationship with nicotine dosage and maggot length and weight and a positive relationship on growth rate with cotinine. These results could greatly affect PMI estimations and, consequently, lead to a wrongful conviction.

Khanov, Anna, M. King, S. Mares, and M. Patrauchan (Oklahoma State University)

IS THE CARP GENE, ENCODING CALCIUM-REGULATED PROTEIN, UNIQUE TO *PSEUDOMONAS AERUGINOSA*?

Pseudomonas aeruginosa infects patients with Cystic Fibrosis (CF), burns, wounds, and implants. In the lungs of patients with CF, *P. aeruginosa* encounters elevated levels of calcium. Our lab showed that elevated calcium enhances virulence and infectivity of *P. aeruginosa*. Aiming to characterize the molecular mechanisms of calcium regulation, we identified a Calcium-regulated β -propeller protein, CarP. We showed that CarP is required for cell tolerance to high levels of calcium. The protein is involved in regulating intracellular calcium homeostasis and production of several virulence factors. It also plays role in the pathogen's ability to kill *Galleria mellonella* as a virulence model. Sequence analyses determined that carP homologs are only detected in *Pseudomonas* genus, and only

in *P. aeruginosa*. Based on this, we hypothesized that carP can serve as a biomarker for detecting *P. aeruginosa* in environmental settings. To test this hypothesis, we collected environmental samples from diverse sources, isolated pure bacterial cultures on Luria Bertani agar and characterized their morphology. Further, we tested whether the genomes of the isolates encode homologs of carP. For this, we performed a colony PCR using carP specific primers. Currently, we are aiming to identify the cultures by amplifying and sequencing their 16S rRNA genes. Thus far, we have isolated nine environmental bacteria that do not encode carP and are morphologically distinct from *P. aeruginosa*. One of these organisms was identified as *P. montelli* based on its 16S rRNA sequence which shares 88% identity with PAO1 16S rRNA. Lastly, to further validate the specificity of the carP primers to *P. aeruginosa*, we obtained 3 environmental bacterial strains, representing 3 species. No carP amplification was detected. These results highlight the conservation of carP amongst *P. aeruginosa* environmental isolates, which strengthens the potential for this gene to be used as a biomarker for *P. aeruginosa*.

Kidd, Aaron, Elizabeth Allan, and Mike Nelson (University of Central Oklahoma)

****THE EFFECT OF ARGUMENT-BASED NAÏVE MODEL DEVELOPMENT UPON STUDENT CONTENT KNOWLEDGE AND PERCEPTION OF SCIENCE: MIDDLE SCHOOL SCIENCE CLASSROOM**

Since the release of the 2012 Framework for K-12 Science Education, educational institutions have been tasked to increase scientific literacy through the implementation of more robust science standards. The Framework identifies three key dimensions of science education: Scientific and Engineering Practices, Crosscutting Concepts, and Disciplinary Core Ideas. The Scientific and Engineering Practices are composed of a variety of broad science-oriented skills such as engineering, mathematics, and argumentation. Research has clearly indicated the efficacy of engineering in fostering science education. However, the effectiveness of argumentation has not been fully explored, particularly in middle-level classrooms. In the spring semester of 2019, 151 7th grade science students participated in two treatment and three control science curricular units. In treatment units, students were presented a unit-specific phenomenon and provided a limited time frame to develop naïve explanatory models (those lacking scientific data). Classes then engaged in student-led argument sessions to debate and further develop their proposed initial models. Pre and post-assessment results indicated greater content knowledge growth occurred in Honors courses following treatment units while mid-low level classes showed little difference regardless of unit type. Despite generally positive student responses collected through randomly selected interviews however, overall interest in science was not significantly impacted by participation in treatment sessions.

King, Chad B. (University of Central Oklahoma)

DYNAMICS OF A BOTTOMLAND FOREST AT ARCADIA LAKE, OKLAHOMA COUNTY, OKLAHOMA

In central and eastern Oklahoma, the dominant bottomland forest type is the *Ulmus-Fraxinus-Populus* (elm-ash-cottonwood) complex. In October 2016, *Agrilus planipennis* (emerald ash borer; EAB), an invasive wood-boring insect was discovered in Delaware County, Oklahoma. This insect is a threat to *Fraxinus* species throughout North America that has resulted in nearly 99% *Fraxinus* mortality. Beginning in 2016, my students and I began a long-term study of the bottomland forest around Arcadia Lake, Oklahoma County, Oklahoma in which green ash (*F. pennsylvanica*, Marshall) is one of the most important species. This site provides an opportunity to study green ash population dynamics prior to possible invasion by EAB. We tagged 385 individual green ash (>5 cm diameter) in 2016. Tagged trees were georeferenced and diameter at breast height (cm) and height (m) were measured. Increment cores (n = 65) were collected from a subset of green ash to estimate tree age. During spring 2018, we noted an increase in beaver (*Castor canadensis*) activity at our study site. We discovered that approximately 18% (n = 70) of tagged green ash had some type of beaver damage. In summer 2019, we began resampling tagged green ash to estimate growth (since 2016), mortality, and crown vigor in order to assess changes that had occurred since 2016. Preliminary 2019 data indicates that 12% (n = 30) of green ash have died since 2016 largely due to a combination of beaver activity, native wood-boring insects, and flooding. This presentation will provide preliminary results for three years of studying the Arcadia Lake bottomland forest and ongoing projects that assess the ecological dynamics of this system in central Oklahoma.

King, Michelle, S. Mares, D. McLeod, L. Kafer, and M. Patrauchan (Oklahoma State University)

****CALCIUM REGULATED PROTEIN, CARP, INTEGRATES MULTIPLE HOST SIGNALS AND MEDIATES CALCIUM REGULATION OF *PSEUDOMONAS AERUGINOSA* VIRULENCE**

Pseudomonas aeruginosa is an opportunistic pathogen causing life-threatening infections. Previously, we showed that elevated calcium (Ca²⁺) increases production of virulence factors and infectivity. In the effort to characterize Ca²⁺ regulatory network, we have identified a Ca²⁺-regulated β -propeller protein, named CarP. CarP is required for Ca²⁺ tolerance, maintenance of intracellular Ca²⁺ homeostasis, and -Ca²⁺-regulated production of pyocyanin. Here we present that CarP plays a major role in Ca²⁺-induced induction of pyoverdine and virulence in *Galleria mellonella*. To better understand the role of CarP in *P. aeruginosa* virulence and interactions with a host, we studied transcriptional regulation of carP. After an in silico analysis of carP intergenic region, we cloned the predicted regulatory elements upstream of promoterless lux operon and monitored the luminescence. Only the fragments containing 36 bp of carP 5' showed a response to Ca²⁺, which required CarR for induction. These fragments also responded to iron and oxidative stress. The transcriptional profiles and challenging with cell supernatants suggested a regulatory role of an unknown QS molecule in a CarR- and Ca²⁺-dependent manner. Overall, the complex transcriptional regulation of carP in response to multiple factors associated with a host, suggests importance of this protein in *P. aeruginosa* infections.

Kubier, Patrick (University of Central Oklahoma)

JESUS OF NAZARETH VS JESUS THE CHRISTIAN: THE CREATION OF ONE'S TRUE JESUS

Citing the Bible or Jesus as examples of why ideals, laws, and societal aspects should change has become a large issue, especially with the political climate becoming more heated daily. Many especially like to claim partiality towards Christianity and its' guidelines and examples, while leaving many laws out of their beliefs. Jesus in the Gospels preaches more about love and caring for others than of

hatred and fighting. Many have altered their view of Jesus to fit their idea of how Jesus should have acted and how Jesus should be viewed to reduce cognitive dissonance. In order to show ideological differences between Jesus of the Gospels and Jesus the Christian, a q-sort was administered to participants (n = 347) with instructions to sort words according to the condition of Jesus. Participants were solicited from undergraduate freshman through Sona-Systems, online through various boards and web sites, and local congregations. Participants consisted of 101 males, 241 females, and five who did not select a choice. Religious belief makeup consisted of 125 Christians, 120 Atheist/Agnostic, and 102 others (broken down into Muslim, Jewish, Baha'I, Buddhist, and Other-Other). Political affiliation was comprised of 105 Republicans, 94 Democrats, 56 Independents, 87 claiming no affiliation, and 5 others, such as Libertarian. A principal components analysis was performed with two factors emerging; a factor representing Jesus of Nazareth and a factor representing Jesus the Christian. Further analysis with MANOVA on political affiliation and religious belief; $F(16,670) = 2.965$, $p < .0005$; Wilks $\Lambda = .872$, $hp2 = .066$. Pairwise comparisons revealed that those that identified as Republican-Christians saw no difference between the two factors, rejecting the null hypothesis. Other combinations of political affiliation and religious belief failed to reject the null hypothesis; they saw a difference between the two factors and between Jesus of Nazareth and Jesus the Christian.

LaMascus, Hadley G. Aaron E. Zahn, and Lindsey J. Long (Oklahoma Christian University)

***PROTEIN YXIM_BACSU PUTATIVE FUNCTION THROUGH COMPUTATIONAL AND KINETIC ANALYSIS**

The purpose of this research was to provide an accurate characterization of 2O14 based on enzyme kinetic data and in silico data. To determine a hypothetical function for 2O14, the sequence of 2O14 was compared on databases such as BLAST, Pfam, and DALI in order to determine similarities with characterized enzymes and enzyme classes. To acquire experimental data, 2O14 was expressed in *E. coli* cells and isolated. The activity of the isolated enzyme was measured for substrates 4-nitrophenyl acetate and 1-nitrophenyl butyrate. These results were analyzed to determine the kinetics of 2O14. These results allowed for a deeper understanding of the function of 2O14.

Lastrina, Michelle (East Central University)

GRAPH PEBBLING - A GAME ON GRAPHS

There are many games that can be played on a graph. This talk will explore the mathematical game of graph pebbling. To play the game, pebbles are placed on the vertices of the graph before performing pebbling moves. We will discuss the game and explore the pebbling number, a corresponding parameter, of some graphs.

LeHew, Karissa^{1,2}, Michael B. Anderson², Kenneth E. Miller², Subhas Das², and Hal Reed¹ (¹Oral Roberts University; ²Oklahoma State University - Center for Health Sciences)

***EVALUATION OF ENZYMATIC AND CHEMICAL EPIDERMAL-DERMAL SEPARATION TECHNIQUES OF RAT SKIN WITH IHC, PCR, AND WB ANALYSIS**

Mammalian skin is made up of two major interlocking components—the epidermis and dermis. The epidermis contains various nerve and immune function capable structures, such as nerve fiber endings and Langerhans cells. There are certain practices, such as certain types of skin replacement grafts, the study of immune diseases, and the study of inflammation, that require the ability to view these structures and their biochemical processes. To fully study these processes in the epidermis, complete separation from the dermis is required while retaining epidermal integrity. There are a few well-known techniques to attain this, one of which would be the treatment of skin with the enzyme Thermolysin. This technique, among others, takes a considerable amount of time to achieve separation, and might not offer the best separation quality. Other methods have been cited for having been successful with a shorter time and more straightforward process, though they have not been wholly analyzed at a molecular/cellular level to observe the integrity of the epidermis post-treatment. Heat and sodium iodide were tested as treatments with fixed Sprague-Dawley rat skin and then analyzed as possible techniques. Heat failed as a separation technique. Sodium Iodide achieved separation at several timepoints and appeared to retain the cellular integrity of the tissue when evaluated with immunohistochemistry, PCR, and western blot analysis.

Maggard, Zack Juby Varughese, Joseph Puskas, and Mohammad R. Hossan (University of Central Oklahoma)

***DESIGN, CHARACTERIZATION AND FLOW ANALYSIS OF BIODEGRADABLE FINE-MESHED FLOW DIVERTERS**

Fine-meshed flow diverters have become a promising and efficient endovascular device to cure aneurysm by controlling blood flow into the aneurysmal sac. However permanent placement of metallic flow diverters and mismatch in flow diverters' mechanical properties with aneurysm morphologies can cause restenosis, late thrombosis, rupture of aneurysm and other vascular complications. The objective of this research is to design and fabricate biocompatible fine-meshed flow diverters and develop functional relationship among mechanical properties of flow diverters, aneurysm morphologies and fluid dynamic parameters using silicon model. A transparent carotid artery model of 5.0-5.92 mm in diameter with varying sizes aneurysm (10 mm – 25 mm) was developed by hot air thermoforming method in polyurethane tubing. Fine-meshed flow diverters with three different pore sizes and shapes were designed in SOLIDWORKS™. Biodegradable poly(ϵ -caprolactone) (PCL) flow diverters were then fabricated using high precision custom made electromelting extrusion systems. The radial expansion, longitudinal tensile test and three point bending test of the diverters were performed using the Universal Testing Machine (UTM) with specially constructed metal holder. Compared to conventional metallic flow diverters, the optimum bending, radial and longitudinal strength was found to be 0.8 N/mm, 1.75 N/mm and 25 N/mm. Fluid tests using a micro-PIV were conducted to measure the velocity and the wall shear stress of the mechanically optimum flow diverters. The results show that flexible, higher pore density and lower pore sizes can block the fluid into the aneurysm by 80%. These results can help better understand and use biodegradable flow diverters for aneurysm treatment.

Mak, Jia Xuan Hezha Rasul, and Sanjeeva Gamagedara (University of Central Oklahoma)

***HPLC METHOD DEVELOPMENT AND VALIDATION FOR QUANTITATIVE DETERMINATION OF LUNG CANCER BIOMARKERS IN URINE**

Lung cancer is the most common cause of cancer-related death in men and second most common in women. There are no good clinical markers that can be used to diagnose lung cancer at an early stage and predict its prognosis have been found. A recent study analyzed metabolites in plasma and serum blood samples from lung cancer patients and individuals without cancer using GC/MS and identified a set of metabolites differently expressed in cancer patients. Based on this study, we developed an high performance liquid chromatography (HPLC) diode array detection (DAD) method to detect fumaric acid, pyruvic acid, inosine, and creatinine simultaneously in urine. Creatinine was included to account for the renal dilution. Baseline resolutions for all five biomarkers were obtained in synthetic urine matrix by using a 5% methanol and 95% of 0.6% acetic acid, using a C18 column. The developed HPLC method was validated in synthetic urine matrix using analytical method validation parameters such as linearity, accuracy, reproducibility, robustness, limits of detection and quantitation for accurate quantification. This validated method can potentially be used in a large-scale clinical study. The detailed experimental conditions and results will be presented at the conference.

Mariani, Michael and Yuhao Jiang (Univeristy of Central Oklahoma)

***DESIGN A SPATIO-TEMPORAL FILTER WITH MOTION DETECTION TO ENHANCE THE CONTRAST OF GUIDEWIRE IN DIGITAL X-RAY FLUOROSCOPY**

Fluoroscopic images belong to the classes of low contrast and high noise. Simply reducing X-ray exposure will reduce image quality and degrade detection performance, where the dimensions of interventional devices such as catheters, guide wires, and stents are already placing them on the threshold of visibility. Contrast enhancement has been proven to be an effective technique to improve image quality by selectively increasing the contrast of object without dramatically boosting the noise. In this study, we propose to develop a spatio-temporal filter to detect and extract line-like structures, such as catheters, in the images. Those structures can then be selectively enhanced to improve the visual detection of guidewires. We first apply second-order Gaussian derivative filters to set up the Hessian Matrix. An eigen-analysis of Hessian Matrix with a backtracking algorithm is performed to find the possible line-like structures in the image frame. A guidewire mask can be produced with the extracted line-like structures. The mask will be scaled and added back to the original image to get a spatially contrast enhanced image. The scaling factor is determined from a spatio-temporal channelized human observer model and numerical measures including SNR and CNR. To further improve the performance of this filter, a normalized motion mask is obtained to quantitate the differences among five consecutive frames. A first order temporal filter is then applied to enhance guidewire contrast for the regions where the guidewire in moving by using the motion mask to weight the temporal filtering. Computer generated synthetic simulated fluoroscopic images from models of a real flat panel detector and guidewire devices are used to conduct experiments.

Matthews, Frances, Mohammad Hossan, and Sanjeeva Gamagedara (University of Central Oklahoma)

***NUMERICAL MODELING AND SIMULATION OF A MICROFLUIDIC PLATFORM FOR ENRICHMENT OF LOW ABUNDANCE PROTEINS**

Circulating TGF- β 1 is one of the key regulators of cardiovascular health. The extremely low abundance of circulating TGF- β 1 in blood is one of the major challenges in on-chip purification and extraction. This paper reports numerical modeling and simulation of more than 25000 folds concentration gain of TGF- β 1 in a 2D cascade microchannel using isotachopheresis (ITP). The 4.3 cm long microfluidic channel with 250 times reduction in cross-sectional area from inlet to outlet was used for ITP simulation. The initial cross-sectional area was 1250 micrometer x 100 micrometer and the final cross-sectional area was 50 micrometer x 10 micrometer with 2D step changed. The reduction in cross-sectional area were used to complement ITP concentration gain. COMSOL Multiphysics 5.2 was used to simulate the separation and concentration of two proteins- TGF- β 1 and albumin. The model used the Nernst-Planck equations to predict protein stacking and separation in the sample solution. Microchip with 1D and 2D step changed microfluidic channels were also explored using numerical simulations. In the simulation, the leading electrolyte (LE) was 10mM Hydrochloric acid (HCl) adjusted to a pH of 9.5 with Tris (1M) and the trailing electrolyte (TE) consisted of 60 mM DNP- epsilon -amino-n-caproic acid (EACA) adjusted to a pH of 10.0 with Tris (1M). A constant DC electric potential of 200 V was applied between anode and cathode reservoir. The proteins migration was observed under a fluorescence microscope and images of proteins band in different locations were taken. The initial concentration of TGF- β 1 and alubumin was 1.25 microgram/ml and after ITP concentration, the each protein exhibited more than 25000 folds (~33 mg/ml) concentration gain. This is a significant improvement in protein concentration factor compared to our previous report in an ITP microchip. This demonstration can be utilized in the development of integrated microchip to detect low abundant proteins.

McGill, Bridgett (University of Cental Oklahoma)

***PLEASE DON'T THING ME**

What is love? This question, and well-known song title, needs to be revisited in today's society, lest the misunderstanding of love take an irrevocable toll on the worth of individuals. Today's surface level understanding of love leads to the treatment of people as objects, and can be seen as playing a role in murder, controlling parenting, and dating relationships. Fromm suspected that this could be due to that fact that the art of loving is not cultivated in the same way as success, money, and power are (1956). Where there should be a desire for existential connection between people, finding love is often seen as a quest of acquisition. True love, Fromm stated, is achieved when two beings experience both their own selves and each other from the center of their existence (1956). This goes against the aims of a capitalist society, where success lies in the hands of placid, agreeable cogs who can achieve consistent and standardized work. Consumerism and superficial human contact are the signs of a modern man, and with the lost comprehension of truly loving another, there occurs an alienation from both the self and the rest of humanity (Fromm, 1956). The people of this kind of society, trained to see others for what they are and what they can provide instead of who they are, often use their fellow man as a means to

satiating their own needs. The purpose of this research is to identify how the way people relate to one another is associated with the functionality of their relationships and overall psychological wellbeing through the use of the Psychological Well Being Scale (Ryff & Keyes, 1995) and the Relationship Scales Questionnaire (Griffin & Bartholomew, 1994).

McGuire, Makayla N. and J. Tyler Babek (University of Central Oklahoma)

***EXTRACTS FROM SEA SPONGES INHIBIT FIBROBLAST MIGRATION**

Fibroblasts are the primary connective tissues present in the body and play a large role in wound healing. Human dermal fibroblasts, in vitro, are used to study cellular processes and stimulate a wound-like environment. Inhibition of fibroblast migration can be a preventative method of treatment among fibroproliferative diseases, such as Dupuytren's Contracture. Our goal was to find natural products that inhibit migration. The fibroblasts were plated with an elastomer plug and incubated at 37 °C for two days. On the second day, the elastomer plug was removed to imitate a wound. The size of the wound was then measured. The treatment and media were combined and applied to the cells and incubated for one day. Pictures were retaken the following day. We then obtained measurements from each group. Lastly, the measurements of each treatment were compared to that of the control and data analysis ensued. Treatments were repeated multiple times to ensure the results are replicable. The results suggest that there are inhibitory properties exhibited by sea sponge extracts. Future research will consist of treatment, using the same sea sponge extracts, on Dupuytren's Contracture cells as a potentially non-invasive treatment option.

McKibben, Tracy Nicole Beyer, and Benjamin Farnell (East Central University)

***COST OF MMR VACCINE**

We examined the cost of the MMR vaccine by examining the replicator dynamics, social media trends and rural vs. urban divides. We found bifurcation in the replicator dynamics using the SIR-V model and we are able to place the state of Oklahoma in its bifurcation region. For social media twitter was examined looking for #antivax. we noted that word usage location and sentiment of tweets. Rural and urban counties were analyzed for vaccination rates and no significant difference was found. We can see that if the cost of vaccination remains low then the vaccination rate will remain near the threshold for outbreaks.

Messou, Effouehi (University of Central Oklahoma)

***GENERALIZED MODULAR POLYGONS**

Long before Sudoku people were interested in a different type of number puzzle called a "magic square" which is a square grid filled with distinct positive integers in the range such that each cell contains a different integer and all of the rows, columns, and diagonals must add to the same value. As early as 190BC, mathematicians have been fascinated by these magic squares and have discovered some amazing results concerning them as well as generalizations and modifications of them. In this talk we will describe one such generalization known as the "modular magic square" in which the rows, columns and diagonals must no longer add to the same value, but rather the remainder we obtain when we divide those rows, columns and diagonals sums by some fixed values must be equal. For instance, we could try to find a magic square in which all of the rows, columns and diagonals sum to an even number; where the remainder is 0 upon division by 2; or find a magic square in which all the rows, columns and diagonals sum to an odd number; when the remainder is 1 upon division by 2. We will also discuss how one could consider other polygonal shapes, such as rectangles and triangles (a magic triangle will be an arrangement of positive integers on the sides of a triangle with the same number of integers on each side, so that the sum of integers on each side add to the same value), resulting in "modular magic polygons". Finally, we will share a few of the results we have proven concerning modular magic rectangles; namely, we will describe conditions for which a modular magic rectangle can have rows and columns which all sum to even, or all sum to odd, values.

Michka, Olga V., Tarosha B. Salpadoru. and Marianna A. Patrauchan (Oklahoma State University)

ROLE OF OUTER MEMBRANE PERMEABILITY IN CALCIUM INDUCED RESISTANCE TO POLYMYXIN B IN *PSEUDOMONAS AERUGINOSA

Pseudomonas aeruginosa is a gram negative pathogen and is the third leading cause to hospital-acquired (nosocomial) infections causing death in immunocompromised patients suffering from conditions such as cystic fibrosis (CF). Treatment of *Pseudomonas* infections has become increasingly challenging due to the emerging resistance to all classes of antibiotics, even "last hope" antibiotics, such as polymyxin B. Making the outer membrane less permeable is one of the common mechanisms of resistance to these "last hope" antibiotics. Ca²⁺ is an important messenger that plays a vital role in host-immune responses and Ca²⁺ imbalance associated with many diseases such as endocarditis and CF. We have observed that *Pseudomonas* PA01 is 12 times more resistant to polymyxin B at elevated Ca²⁺ levels. Using chemical mutagenesis, 3 genes were identified: PA2803, PA3237, and PA5317, each of which acts in contribution to Ca²⁺ induced resistance to polymyxin B. Our initial hypothesis was that Ca²⁺ would make the outer membrane less permeable and NPN uptake assay was used to test the outer membrane permeability in response to sub-inhibitory concentrations of membrane permeabilizing agents polymyxin B and EGTA of *Pseudomonas* grown with 5mM Ca²⁺ and 0mM Ca²⁺. However, it was observed that the outer membrane permeability was increased in the presence of Ca²⁺. We aim to discover the mechanism by which this permeability is occurring and to observe the identified genes role in the permeability.

Middleton, Samantha and Stanley Rice (Southeastern Oklahoma State University)

THE EFFECTS OF LIGHT INTENSITY ON GROWTH AND CHLOROPHYLL PRODUCTION IN *CANNABIS

In June of 2018 residents of Oklahoma effectively legalized the consumption and cultivation of medical cannabis for individuals who have a Medical Marijuana Patient Card. We conducted an experiment to determine the biomass allocation and chlorophyll production patterns in low light and high light *Cannabis indica* plants. Clones from the same mother plant were grown under an optic LED light source positioned at different distances from the light. High light plants were closer to the light source than low light plants, thus the light quality was the same in both treatments while the intensity received was different. We weighed stems, leaves, and roots and

measured chlorophyll extracted in DMF to determine plant production and chlorophyll amount. We found low light plants grew taller relative to their total weight than high light plants and had more chlorophyll relative to leaf area. Relative leaf weight was not affected by growth light level. Middleton can cultivate up to 6 nonflowering cannabis plants legally within the state by being a registered medical marijuana patient with the OMMA.

Monaghan, Leann (University of Oklahoma)

*USING MOLECULAR AND MORPHOLOGICAL DATA TO SEPARATE CRYPTIC SPECIES OF RAYLESS *GRINDELIA* (ASTERACEAE)

Grindelia is a genus in the family Asteraceae, also known as the sunflower family. Commonly called the gumplant, because it is full of diterpene resins, it is found throughout the entire central and western United States, Canada, Mexico, and South America. Three species, *G. aphanactis*, *G. fastigiata*, and *G. nuda*, do not possess ray flowers. All three are different phylogenetically, but *G. aphanactis* and *G. nuda* do not have clear morphological characteristics to separate them. These two species are often mixed up or combined. The goal of this study is to use sequence data from the internal transcribed spacer and the external transcribed spacer sections of the nuclear ribosomal DNA to identify a set of collected specimens. Once identified, distribution and morphological data will be used to resolve characteristics to be able to identify the species without sequence data.

Montalva, Jose (East Central University)

**FORGOTTEN KNOWLEDGE. THE CASE OF THE USE OF BUMBLE BEE HONEY BY THE MAPUCHE PEOPLE

In the present work we describe the close relationship between the giant bumble bee *Bombus dahlbomii* Guérin-Méneville and the Mapuche people both of which are native to Chile and Argentina. Historical, domestic and spiritual aspects are mentioned, including the use and harvest of honey. We discuss the lost culture of the Mapuche due to the current state of *B. dahlbomii*.

Moore, Abigail J.¹ and Joachim Kadereit² (¹University of Oklahoma; ²Johannes Gutenberg Universitaet Mainz; Mainz, Germany)

RADSEQ PHYLOGENY OF ALPINE CHERLERIA (CARYOPHYLLACEAE): WHAT DO MORE DATA ACTUALLY TELL US?

Cherleria (formerly part of *Minuartia*) is a genus in the Caryophyllaceae, which consists of perennial subshrubs with white petals, rounded sepals, and a capsule opening by three valves at maturity. It occurs throughout the colder parts of the Northern Hemisphere, but is most diverse in Europe, with one subclade entirely restricted to Europe. Our previous study using sequence data from the nuclear ribosomal DNA showed that nearly all of the species were monophyletic and that this European clade diversified on the Balkan Peninsula and migrated from there into the rest of Europe two to three times. While RADseq data show that the species are generally still monophyletic and produce a similar pattern of relationships among the species, they also show evidence of gene exchange between lineages. This gene exchange may have been important in allowing the plants to colonize new habitats.

Mwangi, Michelle^{1,2}, Sarah Groover², Rashmi Kaul², and William Ranahan¹ (¹Oral Roberts University; ²Oklahoma State University - Center for Health Sciences)

*INTERLEUKIN 33 EXPRESSION IN PATIENTS WITH HEPATITIS C VIRUS-ASSOCIATED CIRRHOSIS AND HEPATOCELLULAR CARCINOMA

Chronic infection with hepatitis C virus (HCV) in the liver is a major risk factor for inflammation-mediated fibrosis and cirrhosis, which can then lead to hepatocellular carcinoma (HCC) and death. Major challenges include the irreversible nature of cirrhosis and the fact that there are currently no biomarkers available to monitor inflammation and fibrosis. Interleukin 33 (IL-33) is a protein that has been implicated in other fibrotic diseases as a marker for inflammation, so its role in the liver is of great interest. We observed IL-33 protein expression in nuclear and cytoplasmic extracts of liver tissues from healthy, HCV/cirrhosis, and HCV/HCC samples by Western blot. Protein expression was determined using Image J and normalized to the expression of beta-actin. We found that nuclear IL-33 expression was significantly increased in human liver tissues with HCV-associated cirrhosis and HCC, as compared to healthy patients. Qualitative assessment of IL-33 showed little to no cytoplasmic expression of IL-33 in all three subgroups. Future studies will investigate the differential expression of IL-33 in the cytoplasm and nucleus by western blot with more samples as well as correlate disease activity with IL-33 and its utilization as a disease biomarker in HCV-related cancer development.

Myskey, Kourtney (East Central University)

*COMPARISON OF MICROHABITAT SELECTION BETWEEN RIFFLE DWELLING DARTERS, THE ORANGETHROAT DARTER (*ETHEOSTOMA SPECTABILE*) AND ORANGEBELLY DARTER (*ETHEOSTOMA RADIOSUM*) IN UPPER BLUE RIVER OF OKLAHOMA

The Blue River of south-central Oklahoma is a spring-fed stream that drains much of the eastern Arbuckle-Simpson Aquifer, and is one of only two free-flowing rivers in Oklahoma with little to no anthropogenic influences on the natural flow. Not much is known about the riffle-dwelling fish communities in the upper reaches of the Blue River. In collaboration with The Nature Conservancy, assessments of fish inhabiting riffle mesohabitats of the Blue River were conducted in the summer of 2018. Individual fish were identified to species and biological metrics were calculated. Relative abundance from two data sets was measured for the Orangethroat darter (*Etheostoma spectabile*) and Orangebelly darter (*Etheostoma radiosum*). A total of eighteen species of fish were collected from the riffle mesohabitats in the upper reaches of the Blue River. The Orangethroat and Orangebelly darter were more likely to be found in areas in the riffles where river bed particles were in the small to large cobble size range. Looking at biota in this river could give insight into how different habitats function in a free-flowing river, and more specifically, in riffle habitats of the Blue River since these areas will be the first habitats affected if flows are reduced from withdrawals of water from the Arbuckle-Simpson Aquifer

Nambiar, Nayna¹ Shrea Tyagi², B.J. Reddig³, P. Litt⁴, D. Jaroni⁴, and E.L. Blewett³ (¹Holland Hall, Tulsa, OK; ²Union High School, Tulsa, OK; ³Oklahoma State University - Center for Health Sciences; ⁴Oklahoma State University)

* Undergraduate ** Graduate

CLONING AND SEQUENCING OF THE DEPOLYMERASE-LIKE GENE FROM BACTERIOPHAGE J25

Bacteriophage are viruses that infect, replicate and kill bacteria. Salmonella and EHEC food poisoning are caused by Salmonella and *E. coli* bacteria. Bacteriophage can be used to prevent food poisoning by application to food products or processing machinery. Bacteriophage J25 specifically infects Salmonella and *E. coli* bacteria. We cloned fragments of the J25 genome, sequence the DNA and used bioinformatics to identify J25. We used genome data from similar bacteriophage in Genbank to design primers to amplify the depolymerase-like gene. We amplified and cloned this gene. When expressed, the gene product will be test with bacteriophage food treatment where it should augment bacteriophage killing.

Ned, Abigail (University of Cental Oklahoma)

*ADHD TREATMENT FOR COLLEGE STUDENTS

Attention-Deficit Hyperactivity-Disorder (ADHD) is a chronic psychological disorder that affects up to 8% of the college population; however, research has focused almost solely on adolescents and teens. Despite the fact that ADHD persists into young adulthood in 80% of those students that are diagnosed as children, there is little to no research done on this critical time period (Fleming & McMahon 2012). Research shows that students with ADHD have lower academic performance and are less likely to complete a bachelor's degree. In addition, they are more likely to drop out of college at a higher rate than their non-ADHD peers (Weyandt & DuPaul, 2013). In regard to treatment for college-age ADHD students, Dupaul et al. (2012) found that Lisdexamfetamine reduced symptoms of ADHD in college students. Simon-Dack, Rodriguez, and Marcum (2016) found that ADHD students often approached studying with surface motives (i.e studying due to fear of failure) and surface strategies (studying using a narrow target result, i.e rote learning). One strategy for assisting this population of students could be to provide resources to aid in deeper processing of information and increase intrinsic motivation. Since many college-aged individuals with ADHD share an increase in both depression and anxiety as they progress into adulthood, there is a desperate need for more research in this population, how they can cope with their mental health disorder, and the best methods for them to strive in the classroom.

Nelson, Benjamin N.¹, Cheyenne Daugherty¹, Vineet I. Patel², Jordan P. Metcalf², and Karen L. Wozniak¹ (¹Oklahoma State University; ²University of Oklahoma - Health Sciences Center)

**INTERACTIONS OF *CRYPTOCOCCUS NEOFORMANS* WITH HUMAN AIRWAY PHAGOCYTES

Cryptococcal meningitis is caused by the opportunistic fungal pathogen *Cryptococcus neoformans* and causes over 180,000 yearly deaths of HIV/AIDS patients. Initial interactions with the fungus begin in the lung and occur with phagocytes, such as macrophages and dendritic cells (DCs). Destruction of the pathogen will occur within a DC, but survival and replication can occur inside some macrophages. Six different subsets of airway phagocytes have been characterized in a healthy human lung. However, it is unknown which subsets of these phagocytes are responsible for the killing or intracellular survival of *C. neoformans*. We hypothesize that there are differences with both uptake and survival of *C. neoformans* among the phagocytic subsets. Human bronchoalveolar lavage containing these six phagocytic subsets from healthy individuals was incubated with an mCherry expressing *C. neoformans* for two hours with opsonizing antibody. Cells were examined by flow cytometry to determine association of the fungus with each subset and by fluorescence microscopy to determine intracellular cryptococcal morphology, c-shape or budding, to indicate killing or replication, respectively. Results showed that all six subsets were able to interact with *C. neoformans*, and changes in fungal morphology were observed by microscopy in at least two of the subsets, one indicating cryptococcal killing and one indicating fungal replication. These findings suggest that fate of the pathogen depends on the specific subset of phagocyte it encounters. Future studies will use single-cell RNA sequencing to determine which genes are differently regulated among the phagocytic subsets following interaction with *C. neoformans*.

Ng, Pei Jia and Ramanjulu Sunkar (Oklahoma State University)

**EPIGENETIC REGULATION OF MICRORNA395 IN ARABIDOPSIS IN RESPONSE TO SULFATE DEPRIVATION

The chromatin remodeling, histone variants, DNA methylation and histone modifications, all bring changes in the chromatin state and play an essential role in regulating gene expression. In plants, microRNAs act as master regulators in various biological processes such as the plant growth and development and stress responses including nutrient deprivation. Previously we have shown that microRNA395 (miR395) is strongly induced by sulfate starvation in Arabidopsis and regulates the transcript abundances of a sulfate transporter (AST) and three ATP sulfurylases (APS) (Jagadeeswaran et al., 2014). In the present study, we propose to decipher the role of H2A.Z (histone variant) and epigenetic regulators in induction of miR395 during sulfate deprivation. Gene expression is positively correlated with the presence of H2A.Z at a locus. To address the role of H2A.Z in miR395 regulation, we are utilizing knockout mutants in genes encoding H2A.Z (*hta9* and *hta11*) in Arabidopsis. Furthermore, H2A.Z promotes the binding of H3K4 methyltransferase (ATX) and promotes H3K4me3 deposition. To address the role of histone modifications (H3K4) in miR395 regulation, we are utilizing mutants defective in H3K4 methyltransferases (ATX1 and ATX2). Our methodology include measuring the expression levels of MIR395 loci using qPCR, and assaying for histone modifications using ChIP assay in H2A.Z mutants (*hta9* and *hta11*) and H3K4 methyltransferase mutants (*atx1* and *atx2*) under sulfate-deprivation. We will present our current progress on this project. Overall, the results will contribute to our understanding on the role of chromatin remodelers and epigenetic regulators in regulating miR395 expression under sulfate deprivation.

Nurbyek, Nazka Michaela L Vance, Gabriella M Smith, and Nikki J Seagraves (University of Central Oklahoma)

*EFFECT OF PHENYLALANINE, RETINOIC ACID, AND DIETHYLAMINO BENZALDEHYDE ON PROLIFERATION OF O9-1 MOUSE CRANIAL NEURAL CREST CELLS

Maternal phenylketonuria [MPKU] is a syndrome of multiple congenital anomalies including cardiovascular malformations [CVMs], and brain and growth restriction when a mother with Phenylketonuria [PKU] does not control her dietary intake of Phenylalanine [Phe]. However, the mechanisms responsible for Phe-induced CVMs are poorly understood. Our lab has preliminary evidence that high levels

of Phe could inhibit Retinoic Acid [RA] signaling, which typically promotes the expression of genes controlling proliferation, migration, and differentiation. Proliferation of the neural crest cells are important in formation of the outflow tract (OFT) and aortic arch arteries (AAA). We hypothesize that Phe inhibits proliferation, which may contribute to the defects seen in MPKU. We also looked at the effects of exposure to RA and 4-diethylaminobenzaldehyde [DEAB], a known RA inhibitor. We conducted in-vitro proliferation assays on mouse neural crest cells o9-1, to determine the effect of Phe, RA, and DEAB exposure on proliferation. Images were analyzed with ImageJ and GraphPad Prism. Present research suggests that Phe exposure causes a significant decrease in proliferation of cells. It has been shown that RA increases proliferation, and that DEAB decreases cell proliferation. In this way, Phe induced a similar response to DEAB, which suggests that it may act as an RA inhibitor. This could contribute to the CVMs observed in MPKU. This work is significant because it eludes to a potential mechanism that Phe could affect RA signaling, thus resulting in the types of defects observed in human MPKU.

Paden, Chloe and Abigail J. Moore (University of Oklahoma)

****USING RADSEQ TO EXAMINE GENETIC VARIATION IN OKLAHOMA'S *SORGHASTRUM NUTANS***

Sorghastrum nutans is a perennial, C4 grass native to the Great Plains region of North America. The historical extent of the tallgrass prairie is greatly reduced, which could cause shifts in genetic diversity of its species. Using ddRADseq, we aim to understand how *S. nutans* varies across the state of Oklahoma- especially its precipitation gradient. ddRADseq is a next-generation sequencing method with the ability to sample the same DNA fragments in different individuals for ease of analysis. We will explore the potential for genetic groupings in *S. nutans* and how those may be an important factor when collecting seed for restoration projects.

Paden, J. Mark (Rogers State University)

IMPACTS OF ROADS AND MITIGATION EFFORTS ON THE VIABILITY OF DESERT TORTOISE (*GOPHERUS AGASSIZII*) POPULATIONS

Effective species conservation requires identifying threats to populations and possible mitigation measures to ameliorate those threats. Infrastructure, such as roads, pose both direct and indirect threats to wildlife, particularly tortoises. To reduce road mortality, conservation managers have installed fencing along roadways. However, the extent to which tortoise populations may benefit from roadside fencing remains unknown due to their long generation times and cryptic behavior. To understand how populations may respond to recovery actions such as roadside fencing, we developed a spatially explicit, individual-based population model. Empirical data from long term datasets – including reproduction rates, age-classes, movement and behavior of desert tortoises – were used to investigate population trends along roads of varying traffic volume. Using these models, we investigated how populations may respond to two recovery tools: 1) roadside fencing and 2) release of head-started tortoises. We found that nearly all roads pose a significant threat to the long-term persistence of local tortoise populations, with roads of high traffic volume leading to severe population declines. While the installation of mitigation fencing effectively stops further population decline, local populations are slow to recover with less than 3% population recovery over 50 years. As a potential tool to assist recovery of these local populations, the release of head-started tortoises to “jump-start” the depleted population was next explored. We simulated releasing juvenile tortoises, aged 5-7 years–old within the landscape post-fencing installation. With the amalgamation of roadside fencing and the release of head-started tortoises, the simulated population increased to near pre-road installation conditions. Our work highlights the priority of understanding long term population dynamics and potential mitigation recovery tools for chelonian species to ensure recovery or population persistence.

Pham, Mai, Jessica Petty, Mai Pham, and Nesreen Alsou (University of Central Oklahoma)

***SMART MEDICAL DEVICE**

To provide accurate, non-invasive, real-time, and less painful monitoring of oxygenation and circulation for pediatric patients in hospitals. To optimize Cardiopulmonary Resuscitation (CPR) for patients utilizing non-invasive values: Cerebral and Renal Regional Oxygen Saturation (C-rSO₂ and R-rSO₂), End-Tidal Carbon Dioxide (EtCO₂), Oxygen Saturation (SpO₂), and Volume of CO₂ (VCO₂) signals. Signals are to be intercepted real-time from INVOSTM 5100C Cerebral/Somatic Oximeter and Respiration NM3 Profile Monitor. Values will be processed through algorithms to determine the likelihood of Return of Sudden Circulation (ROSC) using Youden Index. Oxygenation and circulation variables will be measured using Near Infrared Spectroscopy (NIRS). This will output to a monitor and be viewed by a medical official or technician to view along with generated plots of intercepted readings. This approach for non-invasive, real-time monitoring can be evaluated further by implementing algorithms of trending vitals in patients after using this device and gathering data in numerous patients. This can provide early detection of patients likely to undergo cardiac arrest so medical officials can provide medicine or medical attention as needed to address the issues that may lead to cardiac arrest or intervene during cardiac arrest.

Pjesky, Taylor and Robert Mather (University of Central Oklahoma)

***PERCEIVING CHARACTERISTICS OF ABDUCTED CHILDREN**

The goal of the media is to get recognition and views. Due to this goal, the media does not always provide accurate information to the public. This especially happens when the media covers child abduction cases. This leads to the public misunderstanding a very important topic, our children. This study will aid in the correction of these misunderstandings, which can be used in prevention programs. Participants will be primed with facts and statistics concerning characteristics of abducted children. They will then complete an online questionnaire about the probable characteristics of abducted children. It is hypothesized that the four primed experimental groups will show more accurate knowledge of characteristics of abducted children, whereas, the control group will show beliefs of common myths, and less accurate information surrounding characteristics of abducted children. Data are still being collected.

Poole, Cassandra (University of Science and Arts of Oklahoma)

***DEMOGRAPHIC INVESTIGATION USING GRAVESTONE ANALYSIS AT ROSE HILL CEMETERY, CHICKASHA, OKLAHOMA**

An evaluation of survivorship using demographic data obtained from the Rose Hill Cemetery in Chickasha, Oklahoma was conducted to identify changes over the last century. Using cemetery demography techniques to collect birth and death dates in definite decade cohorts to calculate the survivorship in the Rose Hill Cemetery. The survivorship data will then be compared between males and females to determine gender survivorship. The finalizing data will then be correlated with influential historical events that may have influenced survivorship of the local population.

Prinz, Emmaline (Oklahoma Christian University)

***INVESTIGATION OF POSSIBLE ENVIRONMENTAL TRIGGERS FOR THE ONSET OF SARCOIDOSIS DISEASE SYMPTOMS**

Sarcoidosis is primarily a respiratory disease, but can have systemic effects as well. Active sarcoidosis disease state is often characterized by granuloma formation, typically in the lungs. These granulomas are clumps of immune cells. In healthy patients, granulomas form to prevent hazardous molecules from entering the rest of the body and dissipate once the threat has been neutralized. However, for diseased patients, the granulomas do not shrink and ultimately, form scar tissue. Some key cells in granuloma formation are CD4+, CD8+ and monocytes. Beyond this, the etiology of this disease is a mystery, yet there are a few key components. First, there is a genetic element to the occurrence of this disease as patients often have a history of affected family members. Environmental factors also play a role in the onset of this disease as firefighters and 9/11 first responders have an unprecedented occurrence of disease compared to the general population. Thus, there is much to learn about sarcoidosis before it can be actively prevented or permanently treated. In my project, peripheral blood mononuclear cells (PBMCs) from healthy controls and sarcoidosis patients were stimulated with different environmental factors that are suspected to play a role in triggering disease onset. The stimulating reagents included a protein called vimentin, a protein found in Kveim reagent, and zymosan, a protein from yeast membranes. After stimulation, supernatants were collected and ELISAs were used to measure cytokine (IL-6 and IFN- γ) cytokine responses. Cytokine responses were compared to healthy controls to measure if immune cell activation was dysregulated in sarcoidosis patients. Interestingly, vimentin was found to instigate an IFN- γ response in patients with Sarcoidosis. This indicates that vimentin could play a role in triggering disease onset in sarcoidosis patients.

Pruett, Jake A.¹, Daniel M. Montgomery², and Diana K. Hews² (¹Southeastern Oklahoma State University; ²Indiana State University)

BEHAVIORAL AND CORTICOSTERONE RESPONSES TO PREDATOR CHEMICAL CUES DIFFER IN THREAT-SENSITIVITY

Selection from predators on prey imposes tradeoffs between antipredator responses and activities such as foraging, thermoregulating, and reproductive behavior. The threat-sensitive predator avoidance hypothesis predicts animals will match the intensity of their antipredator responses to the level of threat associated with specific predators. We tested whether male *Sceloporus undulatus* exhibit threat-sensitive behavior and corticosterone responses to chemical cues of snakes. We recorded responses of free-ranging male lizards following presentations of papers with chemical cues of a high-risk predator (*Pantherophis spiloides*), an intermediate-risk predator (*Nerodia sipedon*), a low-risk predator (*Storeria dekayi*), or clean paper. Rates of total activity were higher for males exposed to chemicals from either the intermediate- or high-risk predators compared to total activity of males exposed to chemicals from the low-risk predator or control papers. Lizards exposed to chemicals from high- and intermediate-risk predators performed more head-turns and chemosensory behavior than lizards exposed to chemicals of the low-risk predator or control. There were no significant differences among treatments in mean rates of social displays, movement frequency, or movement distance. Plasma corticosterone levels were elevated in males exposed to chemicals from all three predator species relative to levels of males exposed to control papers. Contrary to the threat-sensitive avoidance hypothesis, there were no significant differences in plasma corticosterone among lizards in the three predator treatments. Our results support findings of previous studies that lizards adjust behavioral responses to at least some variation in threat and that corticosterone may not be involved in mediating these differences in vigilance in lizards.

Reddig, William J.¹ Brett Roberts², Anthony Burgett², and Earl Blewett¹ (¹Oklahoma State University - Center for Health Sciences; ²University of Oklahoma)

INHIBITION OF CLINICAL ENTEROVIRUS ISOLATES BY NATURAL COMPOUND OSW-1

OSW-1 is a small, molecular compound isolated from the bulbs of the plant, *Ornithogalum saundersiae*. OSW-1 has been shown to kill cancer cells and to inhibit viral infection. OSW-1 interacts with cellular oxysterol-binding protein (OSBP) and reduces OSBP in the cell. OSBP is important in host cell cholesterol processing and traffic. Enteroviruses belong to the Picornaviridae family and are single-stranded RNA (ssRNA) viruses. They cause many important human diseases including rashes, pleurodynia, encephalitis and aseptic meningitis. Many ssRNA viruses use host cell membranes to create replication organelles (ROs) in the infected cell. The virus uses ROs to concentrate and hide virus materials from the host cell, to avoid triggering anti-viral responses. We hypothesize all ssRNA viruses create ROs in order to replicate in eukaryotic cells. In this project, we test clinical enterovirus isolates to see if these viruses use OSBP and cholesterol to create their ROs. We show that OSW-1 inhibits infection by Coxsackieviruses A and B, Echoviruses and Enterovirus-D68.

Rice, Stanley (Southeastern Oklahoma State University)

LAYING THAT TRASH ON OKLAHOMA: ESTIMATING THE AMOUNT OF GARBAGE ON OUR HIGHWAYS REQUIRES A KNOWLEDGE OF RESEARCH DESIGN

There is a huge amount of trash along Oklahoma highways. But how much? Even such a simple question requires good research design. Not only is replication necessary (I got 125 counts), but a predetermined sampling method is required that avoids bias. The

* Undergraduate ** Graduate

samples should also have external validity (from more than one location). My estimate is 100 pieces of large garbage (visible from a moving vehicle) per mile on Oklahoma highways. A traveler driving 200 miles would therefore see twenty thousand pieces of garbage.

Salpadoru, Tarosha B.¹, Sharmily Khanam¹, Kerry Williamson², Dirk L. Lenaburg¹, Michael J. Franklin², and Marianna A. Patrauchan¹ (¹Oklahoma State University; ²Montana State University)

****ELEVATED CALCIUM INDUCES RESISTANCE TO POLYMYXIN B IN *PSEUDOMONAS AERUGINOSA***

Pseudomonas aeruginosa is the major cause of death of cystic fibrosis (CF) patients. It is also the third leading cause of nosocomial infections. Due to *P. aeruginosa* high resistance to antibiotics, treating its infections is increasingly challenging, which is further complicated by the emergence of resistance to the “last hope” therapeutic agents, such as cationic peptides, including polymyxin B. Here we show that the presence of physiological levels of calcium (Ca²⁺) in CF lungs enhances resistance in *P. aeruginosa* to polymyxin B. Through chemical mutagenesis, we identified three genes: PA2803, PA3237, and PA5317, each of which contributes to Ca²⁺-induced resistance to polymyxin B. This was confirmed by susceptibility assays of the corresponding transposon mutants and their in-trans genetic complementations. Genome-wide RNA-Seq analyses revealed that the transcription of PA2803 and PA3237 is significantly upregulated in the presence of 5 mM Ca²⁺. Interestingly, the transcription of the two component systems PhoPQ, PmrAB and ParRS, earlier shown to control resistance to polymyxin B in *P. aeruginosa*, were down-regulated by Ca²⁺. These observations suggest the involvement of novel Ca²⁺-dependent mechanisms of polymyxin B resistance. We aim to elucidate the molecular determinants of these mechanisms, which will provide valuable insights into understanding of antibiotic resistance in *P. aeruginosa*.

Sample, Emily, Emily Boyer, Casie Hamill, Destiny Hamilton, Kyler Keef, Tyler McKenzie, Angela Spottedwolf, Rhonda Weigand, and Brenda Witt (Redlands Community College)

***A PRELIMINARY SURVEY OF FRESHWATER SPONGES IN OKLAHOMA**

Freshwater sponge distributions in Oklahoma have been understudied with only two minimal surveys published between 1922 and 1954. To expand upon this previous data, we surveyed littoral areas of selected water bodies throughout central and southern Oklahoma spanning January through March of 2018 and 2019. Water quality parameters including temperature, pH, salinity, specific conductivity, and dissolved oxygen were measured at each site using the In-Situ smarTROLL Multiparameter Handheld probe. Any substrate for which sponges would be likely to attach, such as rocks and logs, were visually examined and samples of adult sponges or reproductive gemmules were collected using sterile razor blades and stored in 70% ethanol to be identified via DNA barcoding. Of the sites sampled, 9 of 21 were positive for sponge presence and sites with and without sponges were marked on a state county map. A non-metric multi-dimensional scaling analysis (NMDS) indicated that sites with sponges were distinctly dissimilar from those where sponges were not found. Further analysis suggested that pH and specific conductivity are the main drivers of these differences, however a larger sample size inclusive of a wider variety of geological and ecological areas will better illustrate trends in preferred environmental conditions. Our study demonstrates that freshwater sponges are established in Oklahoma and that continued statewide surveying will further knowledge of their habitats and role in ecosystems.

Sargeant, Katelyn (University of Central Oklahoma)

***THE WOES OF MEN: A HISTORY AND ANALYSIS OF MEN’S RIGHTS ACTIVIST AND INVOLUNTARY CELIBATE MOVEMENTS, 1856- PRESENT**

The purpose of this research is to bring the Men’s Rights Movements to the forefront of academic inquiry, especially within the academic realm. These movements have gained media

attention in recent years due to acts of violence perpetrated by individuals who claim to be part of these groups. Bringing these movements and ideals to the mainstream allows for greater academic and social scrutiny without and moves them forward from the depths of the internet. Mindsets such as these are detrimental to society and its continued progression toward inclusive and non-misogynistic spaces. The catalyst for this research was the 2014 mass shooting and terrorist attack perpetrated by Elliot Rodger and the subsequent worship he received posthumously by various online communities. Elliot’s attack lit a fuse in the minds of others who felt the same way leading to two other attacks and an explosion of rhetoric in their online communities. This is not the first movement such as this to happen throughout history. Indeed, Men’s Rights Movements have existed since the 19th century and these movements have corresponded with the rise and popularization of the internet leading to its ability to spread misogynistic views rapidly through the world.

Segrest, Austin and Melville Vaughan (University of Central Oklahoma)

***PHENOTYPICAL DIFFERENCES OF YOUNG AND OLD DUPUYTREN’S DISEASE CELLS: MIGRATION AND FOCAL ADHESION ANALYSIS**

Dupuytren’s disease (DD) is characterized by an accumulation of fibroblasts that contribute to the formation of a cord of fascial tissue in the hand that impairs movement and utility. Treatments for this contracture include surgical removal and collagenase treatment. Recurrence of contracture after removal is common but to lesser severity than the original cord. Our goal was to study how in vitro aging of DD cells would affect their phenotype. Dupuytren’s disease cells were cultured in vitro with 5% fetal bovine serum in Dulbecco’s Modified Eagle Medium with an Antibiotic-antimycotic. Old and young cells from the same cell line were compared in a scratch wound migration assay, without serum, at varying concentrations of platelet-derived growth factor to minimize and quantify the effect that cellular proliferation had on wound closure. Preliminary findings show older cells have a decreased ability to migrate. We asked whether in vitro aging differences were due to changes in proteins used to adhere cells to their matrix (focal adhesions). Cells treated with TGF- β to elicit myofibroblast phenotypes, were stained to identify focal adhesions followed by photography and analysis. These studies may provide evidence comparable to changes in recurring DD cells in vivo.

Shupe, Amelia and Ratnakar Deole (Northeastern State University)

***BIOLOGICAL CHARACTERIZATION OF A PEPTIDE ANTIBIOTIC PRODUCED BY A HALOPHILIC ARCHAEON**

Antibiotic-resistant bacteria pose a major risk to public health. Their ever-evolving nature requires a relentless pursuit of new and different sources of antibiotics to attempt to control this critical issue. Investigating environments in which common antibiotic-resistant bacteria do not reside, and the native antimicrobials therein, could provide a potential source for novel antibiotics. One possible avenue is microorganisms within environments with a high salt concentration called halophiles, a type of salt dependent archaea. Halophiles produce their own antimicrobials, called halocins, which they secrete into the surrounding environment. This project focused on a halocin isolated from a strain of halophilic archaea and was characterized in an attempt to better understand its function and features. The halocin sample was found to be effective against Gram positive bacteria. It was sensitive to treatment with the proteases papain and thrombin, indicating its composition was protein based. The optimal environmental temperature range for greatest efficacy was 25-40 °C. The optimal environmental pH for maintaining efficacy was 7-9 pH. An SDS-PAGE test concluded the size of the halocin to be approximately 50 kD. The halocin lost its antagonistic activity when diluted to 12.5% of its original concentration in a minimum inhibitory concentration test. Additional characterization of this halocin, including determining mechanism of action and the amino acid sequence, could provide a deeper understanding of its possible applications in the epidemiological field.

Slattery, Connor (Southwestern Oklahoma State University)

***PHENOTYPIC PLASTICITY OF FRESHWATER AMPHIPODS**

This experiment was done to test the phenotypic plasticity of the populations of freshwater amphipods in the genus *Hyalella* from Roman Nose State Park at Watonga OK. Humans are causing rapid change to environments across the globe. These changes often happen too fast for populations to be able to persist long enough to adapt. Some organisms display an ability to respond to changes to the environment within a single individual's lifespan known as phenotypic plasticity. Phenotypic plasticity is the ability for a single genotype to be able to produce multiple phenotypes depending on the environmental conditions. This can allow the population to be able to withstand changes to their environment long enough for adaptation to occur. The amphipods of Roman Nose State Park spring system likely have phenotypic plasticity because the amphipods would likely experience movement between at least two very different environments, the pool of the spring and the adjacent run of flowing water that. To study this we collected individual *Hyalella* from multiple spring's pools and runs as well as a sample of the invertebrate population of the springs to gain a better understanding of the differences in the environments. We then raised amphipods from multiple springs under common conditions to see if the offspring display differences from the wild populations. Amphipods are an important species in many aquatic ecosystems in that they are large consumers of algae as well as are a staple food source for many fish species. This means that the health of the ecosystem is often tied to the health of the amphipods. Having a greater understanding of how the amphipods will respond to changes in their environment will allow us to monitor the systems they live in.

Smith, Joe, Jeremy Alexander, and Lindsey J. Long (Oklahoma Christian University)

***DIFFERENT GENES, SAME PROTEIN**

The purpose of our research was focused on how genomes were organized and how the organization affects the expression of genes. For most species, the heterochromatic regions of chromatin repress gene expression. However, there are examples in the *Drosophila melanogaster* of heterochromatic regions in the genome that are permissive to gene expression. In order to investigate this anomaly, genes in *Drosophila takahashii* were annotated to determine changes in the gene structure throughout evolution. Since there was a close phylogenetic relationship between *D. takahashii* and *D. melanogaster* their genomes were compared throughout the annotation. The genomic tools, such as the USC genome browser, BlastP, Fly Base, and Gene Record Finders were used to analyze the genomic region of interest, contig 39 on chromosome 3L. Once the start codons, stop codon, and exon splice sites were determined, the gene structure was analyzed. Genes were determined to be orthologous based on the Gene Model Checker and the Dot Plot that the checker produced. However, only a total of three of the genes were determined to have high homology, and one gene was determined to exist even though there was only a slight amount of homology. A future direction of this study is *D. takahashii* could be used to annotate genes of flies closely related to it and investigating any potential differences in the epigenome.

Smith, Tykia and Vickie M. Jean (University of Central Oklahoma)

***SELF-LOVE AMONG WOMEN OF ALL AGES**

The goal of this research to improve self-love among female of all ages; how can we improve/ bring awareness to young women. Love can be unconditional and yet hard to understand at times; most individuals will claim that they know and understand the true meaning of self-love. Some will claim that they have self-love, but secretly struggle with loving and expecting themselves. Self love or self awareness is not often talked about among young adults in today's society. The reasoning behind this, is because individuals will lie to hide the real pain and confusing. Most individuals will lie in hopes of being accepted by their peers. Social media plays a key role in self-love, most individuals will compare themselves with other individuals who they see on tv, instagram, facebook and other social media apps. If not proceed with caution, social media will influence the individual to believe that they are not good enough. The feeling of not being enough could push the individual to change their body image, bleach their skin, or inflict self harm. Female's are more known to struggle with their own body image as well as comparing themselves to other females. Female's will compare themselves to others to make them feel better about themselves. However, this is only a temporary feeling for the individual. This study will bring awareness to both young and older females who are struggling with loving themselves; self-love is not something most will talk about nor know the true meaning.

Strecker, Bailey¹ Jonathan J. Hunt¹, Ryan Heselpoth², Vincent A. Fischetti², and Michelle C. Callegan³ (¹Oklahoma Christian University; ²Rockefeller University; ³University of Oklahoma - Health Science Center)

***TREATMENT OF *PSEUDOMONAS AERUGINOSA* CORNEAL INFECTION WITH BIOENGINEERED LYSOCIN PYS2-GN4**

Keratitis, or more simply, inflammation of the cornea may or may not be associated with an infection. Keratitis happens most often after a traumatic injury, after operations, and from wearing contact lenses. Antibiotic eye drops are the standard of care for bacterial keratitis. The current problem with using antibiotic eye drops to treat *Pseudomonas aeruginosa* keratitis is the increasing antibiotic resistance. Because of their outer membrane, Gram negative bacteria such as *P. aeruginosa* are resistant to purified lysin. To overcome this limitation, we used a bioengineered, Lysocin PyS2-Gn4 which is a chimeric protein that facilitates the import of the lytic activity into the periplasm of *P. aeruginosa*. This Lysocin has previously been shown to enhance bacterial killing by greater than 3 logs in vitro. Our project focused on the treatment of in vivo corneal *P. aeruginosa* infections with the use of bioengineered Lysocin PyS2-Gn4. *P. aeruginosa* strain 453 was grown in Casamino acid broth overnight and track diluted to determine total colony forming units (CFUs) in the sample. Mice were infected using the scratch method. Once scratched, the eyes were inoculated with *P. aeruginosa* strain 453, allowed to sit for five minutes, and then blotted. Twenty-four hours post infection, the treatment group was treated with PyS-Gn4 and the antibiotic treatment group was treated with Gatifloxacin using the same method as inoculation, without the scratch. PyS-Gn4 remained on the eye for ten minutes. At the time of treatment, the eyes of the non-treatment group were collected, homogenized, and plated to determine CFU of the infection. The eyes of treated mice were collected twenty-four hours post treatment in the same fashion. The efficiency of clearance by PyS-Gn4 was determined by comparing the total CFU of the PyS-Gn4 treated group to the total CFU of the antibiotic treated group, and the untreated group.

Taylor, Andrew T.¹, James M. Long², Binod Chapagain³, and Omkar Joshi³ (¹University of Central Oklahoma; ²U.S. Geological Survey, Oklahoma Cooperative Fish and Wildlife Research Unit; ³Oklahoma State University)

ANGLER CATCH AND ATTITUDES TOWARD BLACK BASS IN OZARK STREAMS

Black basses (*Micropterus* spp.) support economically significant sport fisheries in the U.S. Traditionally, resource biologists have focused on black bass fisheries management within impounded waters. However, streams offer a variety of black bass angling opportunities – including opportunities to catch endemic, fluvial species. To better understand how anglers interact with these resources, we conducted an angler tag-return study and a creel survey in three tributary streams of Lake Tenkiller, OK, from May to August of 2019. The three study streams varied in size and accessibility, from the large and easily-accessible Illinois River to the small and difficult-to-access Caney Creek, with Baron Fork an intermediate of both aspects. We tagged a total of 948 black bass (in proportion to species availability at each site), and completed a total of 114 angler interviews. Both datasets indicated that Smallmouth Bass made up 78-100% of angler catch, with very little harvest reported. Angler demographics also varied greatly by stream, with visitors to Caney Creek anglers traveling less distance on average, and having a lower mean household income, than anglers using the other two streams. Interestingly, when anglers were asked about whether their fishing interest would decrease, increase, or remain the same when told about the unique Neosho subspecies of Smallmouth Bass in the area, anglers at the Baron Fork and the Illinois River had 30-38% of responses indicating an increase in interest, whereas Caney Creek anglers had no increase in interest. Caney Creek anglers were also more harvest-oriented – generally favoring a lower length limit and an increased bag limit – in comparison to anglers at other streams. Our results illustrated that different socioeconomic populations of anglers are drawn to different streams, yet trends in catch and harvest appeared consistent across the study area.

Tayo, Benjamin O. (University of Central Oklahoma)

COMPUTATIONAL MODELING OF ADVANCED MATERIALS FOR PHOTOVOLTAIC AND BIOSENSING APPLICATIONS

Quantum mechanics provides us with a complete set of equations that can be solved in order to determine the properties of any system made up of electrons and nuclei such as atoms, molecules, polymers, and crystals. With the revolution in modern computer technology, it has now become possible to apply quantum mechanics to different fields such as materials sciences, renewable energy, computational biology, drug design, molecular electronics, and genomics. The advantage of computational modeling lies in the fact that we can perform large scale exploratory studies in a fast and cost-effective manner. This can save thousands of dollars compared to trial and error exploratory experimental studies. In this presentation, we discuss how quantum calculations can be used for predicting the properties of redox-active polymers for light-harvesting applications, and 2D materials-biomolecules systems for biosensing applications. This research can shed useful insights that can guide the development of novel photovoltaic devices and DNA sequencing technologies.

Thirunilath, Naveen M. Prashanth Reddy Konari, and Mohammad Robiul Hossan (University of Central Oklahoma)

****EXPERIMENTAL ANALYSIS OF LASER MICROMACHINING OF COMMON MICROFLUIDIC SUBSTRATES**

Laser micromachining technique offers a promising alternative method for rapid production of microfluidic devices. However the effect of process parameters on the channel geometry and quality of channels on common microfluidic substrate has not been fully understood yet. Polydimethylsiloxane (PDMS), Polymethyl methacrylate (PMMA) and microscope glass slides are the most widely used substrates in microfluidics because of its rapid availability, inexpensiveness and superb optical and physical properties. In this research, we studied the effect of laser system parameters on the microchannel characteristics on these three widely used substrates. A commercial CO2 laser system with three degrees of freedom (lateral, longitudinal and vertical) was used for fabricating microchannels on glass. The MUSE Full Spectrum laser system consists of a 45W laser tube, circulating water loop within the laser tube and air cooling of the substrate during machining process. Four laser system parameters - speed, power, focal distance and number of passes were varied to fabricate straight microchannels. The channel characteristics such as depth, width, shape and roughness were measured using scan electron microscope (SEM) and 3D profilometer. The results show that higher speed produces lower depth while higher laser power produces deeper channel regardless of the substrate materials. Out of focus laser machining produces wider but shallower channel. Results also show that the profiles of microchannels can be controlled by increasing the number of passes. Roughness can be

reduced by reducing speed. However, in higher power and slower speed, glass breaks without forming a channel. Hence, optimum combination of all these four laser parameters are needed to fabricate a desired microchannel depending on applications. This comprehensive experimental investigation can provide a useful guidance to fabricate microchannels on glass substrate for various microfluidic applications

Thompson, Thomas¹ and Kevin Blackwood² (¹Open Range Archaeology LLC.; ²East Central University)

A PRELIMINARY ASSESSMENT OF ARCHAEOLOGICAL LITHIC SOURCES WITHIN THE WESTERN ARBUCKLE MOUNTAINS OF SOUTH-CENTRAL OKLAHOMA

This report includes an assessment of recent interdisciplinary survey work, both archaeological and geological, conducted within the western range of the Arbuckle Mountains. This work is primarily focused on a preliminary assessment of a specific local chert variety originating with the Ordovician age Cool Creek formation and evidence of use of this material in the production of stone tools by the Pre-Contact period (prehistoric) inhabitants of this area. Several varieties of chert occur within several limestone formations within the Ordovician Arbuckle Group. Chert nodules are particularly common within the Cool Creek Formation, a middle Arbuckle Group limestone of early Ordovician age, which hosts several large cave systems. Within these cave systems, chert nodules protrude from the cave walls and the floors are typically covered with thick deposits of chert gravel. The Cool Creek Formation contains the greatest prevalence of chert in this region, but much of this material as it occurs in surface exposures is too fractured or small for use in stone tool production. However, surface cobbles large enough to be workable as tool material do regularly occur here. Also, there is also evidence of Pre-Contact tool production from this material in the form of local surface finds of Late Archaic to Woodland period (3000 BC – AD 1000) projectile points including one found in situ inside a cave. Outside of data presented from this assessment, there have been no recorded archaeological surveys conducted within several miles of these Cool Creek chert outcrop sources, and the archaeological relevance of this material is virtually unknown to professional archaeologists in this region.

Tolleson, BreAnn and Katarzyna Roberts (Rogers State University)

*THE EFFECTS OF DAY-TIME NAPPING ON STRESS LEVELS IN COLLEGE STUDENTS MEASURED BY CORTISOL CONCENTRATIONS IN SALIVA

Many people engage in day-time napping, but the mechanisms and benefits of day-time napping are not yet fully determined and understood. College students often suffer from sleep deprivation which adds on to the stress from their college experience. In this study the effects of day-time napping on college students were determined as measured by saliva cortisol levels. Cortisol is a stress marker and elevated concentrations of it in saliva indicate the individual's increased stress level. The participants, grouped according to their napping habits, provided their saliva samples in the period of two weeks. The effects on introducing as well as eliminating daily napping were measured. Salimetrics Salivary Cortisol Elisa kit was used to determine the concentrations of cortisol. A pre and post questionnaires were completed to determine the individual's sleep habits.

Tyagi, Shrea¹, Nayna Nambiar², B.J. Reddig³, P. Litt⁴, D. Jaroni⁴ and E.L. Blewett³. (¹Holland Hall, Tulsa, OK; ²Union High School, Tulsa, OK; ³Oklahoma State University - Center for Health Sciences; ⁴Oklahoma State University)

CLONING, SEQUENCING, AND IDENTIFICATION OF PHAGE P16, AN UNKNOWN *SALMONELLA* OR EHEC (ENTEROHEMORRHAGIC *E. COLI*) BACTERIOPHAGE.

Bacteriophage are viruses that infect, replicate and kill bacteria. *Salmonella* and EHEC food poisoning are caused by *Salmonella* and *E. coli* bacteria. Bacteriophage can be used to prevent food poisoning by application to food products or processing machinery. Bacteriophage P16 specifically infects *Salmonella* and *E. coli* bacteria. We cloned fragments of the P16 genome, sequence the DNA and used bioinformatics to identify P16. Phage P16 is a *Salmonella* phage similar to "Stitch". A phylogenetic tree inferring relationships of P16 and other bacteriophage was created.

Unterschuetz, John A, Abigail J. Moore, and Jenna A. Messick (University of Central Oklahoma)

*MEASURING CHANGES IN PHENOLOGY OF OKLAHOMA ASTERACEAE SPECIES USING HERBARIUM SPECIMENS

Analyzing shifts in plant flowering times (phenology) in response to a changing climate is crucial to comprehending and forecasting the impacts of climate change on the world's plants. Climate and phenology are physiologically linked because temperature and precipitation have been shown to affect flowering date and, thus, a plant's ability to reproduce and survive. Herbaria contain the physical record of reproductive events from past seasons which makes them an important source of long-term data. Many scientists have used herbarium specimens to study flowering phenology and this strategy has indicated more potential effects of climate change. We created novel protocols for scoring the flowering progression of our chosen Sunflower family (Asteraceae) species into numeric categories, following the work of other scientists in flowering phenology. We correlated the year each specimen received a particular flowering score with the day of year in that year, in order to see if each particular score category has shifted earlier or later in the year over the past century. It is difficult to assign distinct flowering scores to specimens from the Asteraceae for many reasons. Not only are the types of structures in each flowering head different between each species, there are also many florets in each head that must be accounted for in the overall score. We are investigating potential shifts in flowering time for three species of the sunflower family in Oklahoma. These species were selected to represent both the morphological and phylogenetic diversity of the Asteraceae family in Oklahoma, and our selection was limited to those species represented in the Robert Bebb Herbarium (OKL) with over 100 specimens each. Our dataset includes the efforts of plant collectors from over 100 years. We will present our data on *Ratibida columnifera*, *Vernonia baldwinii*, and *Liatriis punctata* at this conference.

Voth, Abigail¹ Priya Balasubramanian², and Andriy Yabluchanskiy² (¹Oklahoma Christian University; ²University of Oklahoma - Health Sciences Center)

***BRAIN IRRADIATION AND CEREBROMICROVASCULAR SENECE**

Introduction: Every year, approximately 200,000 people are diagnosed with brain metastasis in the United States and whole brain irradiation (WBI) remains a main treatment option for these individuals. Over 50% of brain tumor survivors develop progressive cognitive impairment after treatment; however, the mechanisms that underlie this decline remain unknown. Our recent data indicates that WBI significantly impairs endothelial function of cerebral vasculature leading to inadequate blood supply to the regions of neuronal activity. WBI is known to induce DNA damage in multiple cell types including endothelial cells. In this work, we hypothesized that WBI-associated DNA damage induces cellular senescence in endothelial cells. Methods: To better understand whether WBI-associated DNA damage induces cellular senescence, the cohort of p16-3MR experimental animals was subjected to fractionated WBI protocol. These transgenic mice carry trimodal fused protein with monomeric red fluorescent protein (mRFP) under senescent-associated p16 promoter. Mice were euthanized 6 months after the treatment and brain tissues were collected for cell sorting and immunohistological analysis of mRFP expressing cells. Results: Cell sorting experiments demonstrated that upon exposure to WBI approximately 2% of brain cells become senescent, out of these 37% are endothelial cells, 22% pericytes, 16% astrocytes, 13% microglia and 12% oligodendrocytes. Immunohistological analysis with anti-Endomucin antibody for endothelial cells revealed that mRFP colocalized with endothelial cells thus confirming WBI-induced senescence in endothelial cells of the cerebrovasculature in the brain. Conclusion: Our immunohistological analysis confirmed findings from cell-sorting experiments indicating that WBI induces cellular senescence in endothelial cells of hippocampus. Future studies require additional experiments to identify cell populations that undergo senescence pathways upon exposure to WBI. Funding: Summer Undergraduate Research Program (SURP), Oklahoma Center for the Advancement of Science and Technology and Cellular and Molecular GeroScience CoBRE (1P20GM125528, sub#5337)

Wagner, Joseph¹, Erin Drewke¹, Ann Almgren², Johannes Blaschke², and Gang Xu¹ (¹University of Central Oklahoma; ²Lawrence Berkeley National Lab)

***DEVELOPMENT OF A COMPUTATIONAL FLUID DYNAMIC MODEL TO STUDY FLAGELLAR BEATING**

In the studying of improving bio-mixing and increasing passive diffusivity it has been determined that active green algae can play a vital role in these systems. This is a result of the cells motility caused by their active flagellum. Even though the primary source of motion for the algae is known, the exact source on the increase of diffusivity of passive systems has not yet been determined. In an effort to determine the exact source of this improved diffusivity, the flagellar beating will be simulation in a computational fluid dynamics model. This model will show the exact forces the fluid experiences from the algae motion. This computational model was created with the use of Fluctuating Hydro Dynamics solver (FHDeX), and Adaptive Mesh Refinement (AMReX). In this modeling process FHDeX solved for the fluid dynamic interactions in a system and factored in thermal noise for the model. While, AMReX was used in order to produces the physical structure of the flagellum. As a result of this process a green algae cell can be simulated to swim through passive particles, showing the fluid dynamic interactions that the flagellum motion has on its surroundings.

Walton, Dorothy¹, Lindsey J. Long¹, and Laura Reed² (¹Oklahoma Christian University; ²University of Alabama)

***UNDERSTANDING GENE EVOLUTION OF THE INSULIN PATHWAY THROUGH SYNTENY**

Genetic material is composed of building blocks called nucleotides which are transcribed into pre-mRNA. The pre-mRNA is processed to create the mRNA that proteins are translated from. When the genome of a particular species is sequenced, the nucleotide sequence of the DNA is determined. Having the nucleotide sequence of a genome is like having an encyclopedia written in a language one does not speak. Although useful information is present, it is not in an understandable format. In order to understand the nucleotide sequence of a gene, it must be annotated. During the annotation process, the coding and noncoding regions of the genome are analyzed to give meaning to the nucleotide sequence. This project focused on examining synteny between *Drosophila* species for proteins involved in the regulation of the insulin pathway. The genes for proteins involved in the regulation of the insulin pathway were examined in all or most species of *Drosophila*. The hypothesis is that genes with connections to other genes involved in the pathway will evolve more slowly than less connected genes. Also, the noncoding regions should logically evolve quicker than coding regions. The gene chico was examined in *D. simulans*, *D. erecta*, and *D. mojavensis* to find synteny between the gene as it is those species compared *D. melanogaster*. In addition to determining the location of the TSS for the gene in each species, the number of isoforms of chico present in each species was identified and compared. Although the project is ongoing, the TSS annotation of chico in these three species provided an interesting example of evolution of genes; *D. melanogaster* is most closely related to *D. erecta* out of all *Drosophila* species. *D. simulans* is relatively close to both *D. melanogaster* and *D. erecta* while *D. mojavensis* is on the opposite side of evolutionary tree.

Wells, Andrew (East Central University)

REGULAR POLYGONS IN HYPERBOLIC GEOMETRY

Nested regular polygons have a variety of interesting patterns involving their heights and angles. This talk briefly looks at whether moving from Euclidean to Hyperbolic geometry significantly affects those patterns and properties or not.

Whiting, Dani and Zach F. Jones (Southwestern Oklahoma State University)

***RAPTOR PERCH AND LOCATION PREFERENCES IN RURAL SOUTHWESTERN OKLAHOMA**

Migrating and overwintering raptor species use a variety of hunting methods and perching types to search for and initiate prey captures from rural and agricultural landscapes surrounding Weatherford, OK. The primary objective of this study was to identify species preferences for perch types (primarily a range of power transmission line pole sizes and materials, as well as pole density) and landscape context (amount of tilled, non-tilled pasture, woodland, man-made structures other than power poles, etc.) near chosen perch

* Undergraduate ** Graduate

locations. Two 48-km routes were sampled beginning in fall 2018, one north and one south of Weatherford, OK. Preliminary data show the following trends: American Kestrels (*Falco sparverius*) primarily used wires between poles; Red-Tailed Hawks (*Buteo jamaicensis*) indicated a preference for trees; Northern Harriers (*Circus cyaneus*) were only seen in flight other than when consuming prey; and Swainson's Hawks (*Buteo swainsoni*) were primarily observed in flight. Additionally, all species preferred areas with little to no presence of man-made structures other than utility poles and fencing around fields. Species' differences in hunting methods and perch types may mitigate competition for common prey items (rodents) during migration and wintering seasons, and the presence of utility poles may increase the number of perch types available enough to encourage increased abundances of some species' populations beyond what would otherwise be possible. These preliminary data indicate that both kestrels and Red-tailed Hawks may benefit greatly from the presence of utility poles and lines.

Williams, Karen (East Central University)

HIGH FREQUENCY STUDY OF THE ACOUSTIC AND MASS ATTENUATION COEFFICIENTS IN LEAD AND ALUMINUM

Previous work (Williams, 2017) revealed a high correlation between the acoustic attenuation coefficient (at 1MHz) with the mass attenuation coefficient for calibrated lead and aluminum samples. In this work, the relationships of the two coefficients in two materials at higher frequencies were examined.

Wilson, Weldon J. (University of Central Oklahoma)

SPEED OF GRAVITY – A NEWTONIAN CALCULATION

A purely Newtonian estimate of the speed of gravity is presented. The argument of Laplace for estimating the lower limit of the speed of propagation of the gravitational interaction is generalized to Newtonian gravitation. The results indicate that current laboratory, solar system, and astrophysical experimental data yield a lower limit for the “speed of gravity” of approximately 104 c.

Wood, Rebecca W.^{1,3}, Lauren Guthridge¹, Emma Thurmond¹, Carla Guthridge¹, Hua Chen¹, Wade deJager¹, Susan Macwana¹, Neelakshi Jog¹, Rebecka Bourn¹, Stan Kamp¹, Rufe Lu^{1,2}, Cristina Arriens¹, Eliza Chakravarty¹, Katherine Thanou¹, Joan T. Merrill¹ (¹Oklahoma Medical Research Foundation; ²University of Oklahoma - Health Sciences Center; ³University of Central Oklahoma)

*VIRAL REACTIVATION AND ENHANCED DISEASE ACTIVITY IN SYSTEMIC LUPUS ERYTHEMATOSUS PATIENTS

Systemic lupus erythematosus (SLE) is a complex autoimmune disease which mainly affects young women. SLE can attack any organ in the body, with the disease fluctuating from active, multi-organ involvement (flares) to minimal disease. What causes flares is unknown. Our objective was to examine serologic evidence of viral exposures and re-activation with respect to SLE disease activity and cytokine levels. Our hypothesis was that reactivation of common latent viruses would increase lupus disease activity. Plasma from 184 SLE patients (n=290) and 49 controls was collected and disease activity measured. Viral responses were detected by ELISAs for EBV-Viral Capsid Antigen (VCA) (IgG and IgA), EBV-Early Antigen (EA) (IgG), Cytomegalovirus (CMV) (IgG), and Herpes Simplex Virus (HSV-1) (IgG). Plasma soluble mediators were measured by multiplex, bead-based assays and ELISAs. Serologic evidence of EBV reactivation was more common in SLE patients, per anti-EA (40% vs 13%; OR=4.57, p=0.0006) or EBV-VCA IgA (36% vs 17%; OR=2.70, p=0.019). Concentrations of EBV-VCA IgG responses were higher in SLE patients compared to controls (EBV VCA ISR = 4.44 vs 3.52; p=0.0021), as were IgA VCA and IgG EA. Cross sectional analysis of SLE patients at high (SLEDAI > 6) (n=126) vs lower (n=166) disease timepoints showed increased IgG EA responses with elevated disease activity (0.822 vs 0.540; p=0.033). SLE patients with anti-EA responses had higher IP10 (p=3.4 X 10⁻¹⁴), BLYS (5.5 X 10⁻⁵), and IL-10 (p=0.00013). HSV1 IgG positive SLE patients also had higher IP10 (2.2 X 10⁻⁷). This study provides serologic evidence supporting roles for viral reactivation and SLE disease flares.

Yadav, Archana, Javier Vilcáez, Ibrahim F. Farag, Britny Johnson, Katherine Mueller, Noha H. Youssef, and Mostafa S. Elshahed (Oklahoma State University)

**A NOVEL BACTERIAL PHYLUM MCINERNEYBACTERIOTA, RECOVERED FROM A HIGH TEMPERATURE AND HIGH SALINITY TERTIARY OIL RESERVOIR IN NORTH CENTRAL OKLAHOMA, USA

To characterize the response of subsurface microbial community to nutrient stimulation in oil reservoirs, microcosms were established using formation waters, isolated soy protein and crude oil from a high salinity (17%), high temperature (50C) water-flooded tertiary oil reservoir in Cushing, OK USA. After 100 days, the microbial community was highly enriched, with 3 distinct taxa *Deferribacter*, *Kosmotoga*, and an OTU unaffiliated with all currently recognized bacterial phyla or candidate phyla constituting 98.6% of the recovered 16S rRNA gene sequences. Survey of global near-full length and high-throughput generated 16S rRNA global datasets identified this lineage as an extremely rare member of the microbial community in a handful of studies, predominantly in anaerobic saline and hypersaline habitats. Using genome-resolved metagenomics, a near complete genome was recovered. Phylogenetic analysis using 120 protein coding genes as well as AAI identity values confirmed its position as a distinct novel bacterial phylum. Genomics analysis predicts a slow-growing, non-spore forming, and non-motile gram-negative rod. Metabolically, the organism is predicted to be a strict anaerobic, fermentative heterotroph, with a predominantly aminolytic substrate preference, although few sugars (glucose and mannose) could also be utilized. Further, the identification of propionate degrading capacity, presence of hydrogenases, and complete lack of respiratory capacities suggests the possibility of syntrophic growth on propionate. Adaptation to high salinity and high temperature is mediated by the synthesis and uptake of multiple osmo/thermoadaptive solutes such as glycine betaine, cDPG and glutamate. Our results provide the first insights into a novel predominantly rare thermohaloanaerobic microbial lineage.

Yahya, Amal H., William Colton, and Matthew T. Cabeen (Oklahoma State University)

**IDENTIFYING PROTEINS WITH NOVEL ROLES IN *PSEUDOMONAS AERUGINOSA* BIOFILM FORMATION

Bacterial biofilms are a common cause of persistent infections. Biofilms comprise a microbial community encapsulated in a self-produced extracellular matrix. Inhabitants of this community are protected by the matrix from external threats such as antibiotics and

host immunity. This protection makes it very difficult to eradicate *P. aeruginosa* biofilms, such as those that are associated with chronic infections in cystic fibrosis patients and in burn wounds. The molecular mechanisms underlying biofilm formation and regulation are not fully understood. Our lab previously showed that deletion of PA14_16550 significantly suppresses biofilm formation when deleted from the chromosome. Interestingly, this observation persists when 16550 is deleted from hyper-biofilm forming strains (PA14 Δ vspF and PA14 Δ bifA) (Cabeen et al., 2016). Also, 16550 is identical to the *P. aeruginosa* PAO1 protein PA3699, which is TetR-type DNA-binding protein. Our results indicate that 16550 can control biofilm signaling, but its targets and precise role are not yet known. We hypothesize that 16550 regulates biofilm formation by facilitating the expression of one or more biofilm-related genes that control the formation of the biofilm matrix. To identify these proteins, we have conducted a visual transposon mutagenesis screen. In this screen, the parental strain is deleted for 16550, resulting in smooth colony morphology. We screened for mutations that reverse the suppressed biofilm phenotype caused by 16550 deletion. Our preliminary results have identified not only genes with potential roles in the 16550 deletion phenotype but also genes with potential roles in biofilm formation more generally, and we are now in the process of validating and further characterizing these genes. These genes include PA14_64710 and glpF. PA14_64710 is a putative extracellular heme-binding protein, and glpF encodes a glycerol uptake facilitator protein. We aim to provide a greater understanding of biofilm regulation to pave the way towards the discovery of novel anti-biofilm therapies.

OKLAHOMA ACADEMY OF SCIENCE

Established in 1909

“The purpose of the Academy shall be to stimulate scientific research; to promote fraternal relationship among those engaged in scientific work in Oklahoma; to diffuse among the citizens of the State a knowledge of the various disciplines of science; and to investigate and publicize the human, natural and educational resources of the State.” (Article 1, Section 2 OAS Constitution)

Activities of the Academy

- Publishes the Proceedings of the Oklahoma Academy of Science, Annals of the Oklahoma Academy of Science and Transactions of the Oklahoma Junior Academy of Science.
- Hosts the Annual Technical Meeting for the presentation of scientific papers by both professional and collegiate scientists.
- Sponsors symposia on selected topics of timely and vital interest to the State and Nation.
- Arranges fall field meetings in different biogeographic regions of the State.
- Coordinates and promotes the activities of the Oklahoma Junior Academy of Science.
- Supervises the activities of the Oklahoma Collegiate Academy of Science.
- Provides research grants and scholarship awards to outstanding proposals submitted by secondary school and undergraduate college students.
- Provides scientific consultation services to governmental and private agencies throughout the State.

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1914	No meeting	1973	C. J. Mankin, OU
1915	C. W. Shannon, OU	1974	N. N. Durham, OSU
1916	C. N. Gould, OU	1975	B. Shirley, TU
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1918	No meeting	1977	D. E. Kizer, Noble Fdn
1919	No meeting	1978	G. Odell, OSU
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1925	(spring) C. E. Sanborn	1984	M. Whitmore, OU
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1926	J. H. Could, OAMC	1986	J. Wilhm, OSU
1927	C. N. Gould, OU	1987	M. K. Patterson, Noble Fdn
1928	O. M. Smith, OAMC	1988	M. P. Carpenter, OU
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1930	L. Long, Okla. City	1991	J. K. McPherson, OSU
1931	A. O. Weese, OU	1993	J. R. Estes, OU
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1940	G. L. Cross, OU	2010	K. R. Hobson, OU
1941	R. W. Jones, OAMC	2012	C. Clifford, NSU
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