2020 Virtual Technical Meeting of the Oklahoma Academy of Science

(*Undergraduate Presenter, **Graduate Presenter)

Sections A: Biological Science & G: Applied Ecology and Conservation (combined)

8:30 CONSISTENT PATTERNS IN 16S AND 18S MICROBIAL DIVERSITY FROM THE SHELLS OF THE COMMON AND WIDESPREAD RED-EARED SLIDER TURTLE (TRACHEMYS SCRIPTA). **Matthew Parks**. University of Central Oklahoma.

8:45 **SHARED GENETIC VARIATION BETWEEN ASCLEPIAS SPECIOSA TORR. AND A. SYRIACA L.: GEOGRAPHIC AND GENOMIC EXTENT, AND PROBABLE CAUSE. **Victor Andreev**. Oklahoma State University.

9:00 **SAFARI AT THE OKLAHOMA CITY ZOO AND BOTANICAL GARDEN. **Jose Montalva**. University of Oklahoma.

9:15 *IMPACT OF REARING DIET PREPARATION ON THE DEVELOPMENT OF THE SECONDARY SCREWWORM, COCHLIOMYIA MACELLARIA (DIPTERA: CALLIPHORIDAE). **Lexie Shepard**. University of Oklahoma.

9:30 *PHENOTYPIC PLASTICITY IN HYALELLA AMPHIPODS ACROSS FRESHWATER SPRINGS. **Connor Slattery**. Southwestern Oklahoma State Universtiy.

9:45 *SEXUAL SELECTION IN RESPONSE TO VARYING LEVELS OF CULTURAL EUTROPHICATION. **Denton Parsells**. Southwestern Oklahoma State Universtiy.

10:00 *INCREASING DIVERGENCE DOWN THE INSULIN PATHWAY SUPPORTED BY THE INSTABILITY OF GENOMIC NEIGHBORHOODS IN EIF4E1. **Christie Ali**. Oklahoma Christian University.

10:15 *FISH COMMUNITY COMPOSITION OF THE BLUE RIVER, OKLAHOMA AND ADJACENT SPRING RUNS WITH FOCUS ON RIFFLE MESOHABITATS. **Lauren Keck**. East Central University.

10:30 **MODELING THE DISTRIBUTION OF A CRITICALLY ENDANGERED TURTLE. **Elyse Ellsworth**. University of Oklahoma.

10:45 **PRELIMINARY INVESTIGATION OF THE ECOLOGY OF HARRIS MUD CRAB IN LAKE TEXOMA. **Shelbie Weaver**. University of Central Oklahoma.

11:00 **DRIVERS OF THE STABILITY OF DIATOM, MACROINVERTEBRATE, AND FISH COMMUNITIES. **Steven Bittner**. University of Oklahoma.

Section C: Physical Sciences

8:30 NOVEL "DERIVATION" OF MAXWELL'S EQUATIONS FOR THE ELECTROMAGNETIC FIELD. **Weldon Wilson**. University of Central Oklahoma.

8:45 GROUND VERIFICATION OF NASA'S GPM PROJECT-A CONTINUATION STUDY. **Karen Williams**. East Central University.

9:00 PHYSISORPTION OF DNA BASES ON NANORIBBONS FROM GRAPHENE, PHOSPHORENE AND SILICENE. **Benjamin Tayo**. University of Central Oklahoma.

9:15 SPECTRA OF SOLID STATE AND TRADITIONAL LIGHTING SOURCES COMPARED. **Douglas Bryhan**. East Central University.

9:30 TRANSPORT AND RECOVERY OF ALUMINUM OXIDE NANOPARTICLES THROUGH LIMESTONE AND DOLOMITE PACKED COLUMNS. **Randall Maples**. East Central University.

9:45   **GRAVITATIONAL RADIATION: MAXWELL-HEAVISIDE FORMULATION. **Cole Prather**. University of Central Oklahoma.

10:00   *COVALENT FUNCTIONALIZATION OF DEFECTIVE GRAPHENE AND CARBON NANOTUBES BY BENZYNE: A DENSITY FUNCTIONAL THEORY STUDY. **Kellan Brown**. East Central University.

10:15   *GREEN CHEMISTRY SYNTHESIS OF IMIDAZOLES FROM 1,2-DIKETONES AND THEIR APPLICATIONS. **Peyton Little**. Cameron University.

10:30   *SYNTHESIS OF POLYURETHANES FROM VEGETABLE OILS USING A GREEN ONE-STEP, ONE-POT ROUTE TO CYCLIC CARBONATES. **Theresa Hinkle**. Cameron University.

10:45   *EFFECTS OF DISTORTION ON AMPLIFIERS. **Ethan Strickler**. East Central University.

11:00   *SYNTHESIS, SURFACE FUNCTIONALIZATION, AND ASSEMBLY OF GOLD NANORODS. **Bailey Spears**. Northeastern State University.

11:15   *FIRST-PRINCIPLES STUDY OF DEFECT FORMATION ENERGIES IN GRAPHENE AND CARBON NANOTUBES. **Bishal Marasini**. East Central University.

11:30   *SOLAR ACTIVITY AND ITS EFFECT ON EARTH'S MAGNETOSPHERE DURING SOLAR CYCLE. **loic rossignaud**. Cameron University.

11:45   *COMPUTATIONAL THERMOCHEMICAL RESULTS FOR GASEOUS BORON HYDROXIDE USING THE G3MP2 COMPOSITE METHOD. **Brenna Hefley**. East Central University.

12:00   *COMPARISON OF G3MP2 THERMOCHEMICAL RESULTS WITH HIGHER LEVEL THEORY RESULTS FOR SELECTED GASEOUS ALUMINUM HYDROXIDES. **Uendi Pustina**. East Central University.

12:15   *PHOTOMETRIC STUDY OF RR LYRAE STAR TV LYN. **SheKayla Love**. Cameron University.

12:30   *PHOTOMETRIC ANALYSIS OF RR LYRAE V494 SCO. **Jonathan Luke Risner**. Cameron University.

Section D: Social Sciences

8:30   BURNOUT AMONG SOCIAL WORKERS: A PRELIMINARY INVESTIGATION OF RECIPROCAL WORK-FAMILY SPILLOVER. **Jennifer Kisamore**. University of Oklahoma-Tulsa.

8:45   *PERCEIVING CHARACTERISTICS OF CHILD ABDUCTORS. **Taylor Pjesky**. University of Central Oklahoma.

9:00   **WORTH NOT FIGHTING FOR: HOW THE COOLIDGE EFFECT REDUCES AGGRESSION. **Terence Clark**. University of Central Oklahoma.

9:15   **WILL YOU STILL LOVE ME TOMORROW? SOCIOMETER THEORY AND SEXUAL SELF-ESTEEM. **Kelsey Bishop**. University of Central Oklahoma.

9:30   *POSITIVE THINKING AND ANXIETY. **LaDana Mitchell**. University of Central Oklahoma.

9:45   *EFFECT OF TIME MANAGEMENT ON THE SLEEP HABITS OF AN UNDERGRADUATE STUDENT. **LaDana Mitchell**. University of Central Oklahoma.

10:00   *DATING DURING COVID-19: A LOOK INTO ACTIVITY ON DATING APPS AND ENGAGEMENT. **Armando Soto**. University of Central Oklahoma.

10:15   **HOW LIFE HISTORY STRATEGIES SHAPE ENDORSEMENT OF CIVILIZING FORCES. **Arlann Erskine**. University of Central Oklahoma.

10:30   **PERPETRATOR CHARACTERISTICS AND EYEWITNESS MEMORY. **Courtlyn Elkins**. University of Central Oklahoma.

Section H: Microbiology

8:30   **DEFINING FUNCTIONAL REGIONS OF THE DICTYOSTELIUM ERK1 AND ERK2 MAPKS USING CHIMERA ANALYSIS. **Ramee Aranda**. Oklahoma State University.

8:45   *GRAM-POSITIVE ANTIBACTERIAL SPECTRUM OF A NOVEL MELANIN-INSPIRED ANTIMICROBIAL. **Daniel Reed**. Oklahoma State University.

9:00   **ISOLATION OF FUNGAL EXTRACELLULAR VESICLES TO HELP IDENTIFY GENES INVOLVED IN EV MECHANISMS. **Rebekkah Friske**. Oklahoma State University.

9:15   *CLONING AND OVER-EXPRESSION OF SSA_0908, A PUTATIVE ENAMINE DEAMINASE FROM STREPTOCOCCUS SANGUINIS, A PATHOBIONT INVOLVED IN INFECTIVE ENDOCARDITIS. **Alexa Benedict**. Southwestern Oklahoma State Universtiy.

9:30   *CLONING AND OVER-EXPRESSION OF SSA_0908, A PUTATIVE SUBSTRATE BINDING PROTEIN FROM STREPTOCOCCUS SANGUINIS, AN OPPORTUNISTIC PATHOGEN INVOLVED IN INFECTIVE ENDOCARDITIS. **Camille Goerend**. Southwestern Oklahoma State Universtiy.

9:45   *ESCHERICHIA COLI GROWTH ON RHAMNONATE-ENRICHED MEDIA. **Lauren Keck**. East Central University.

10:00   *ANALYSIS OF GA1 AND GA2 AND THEIR ROLES IN CELL SIGNALING. **Stormie Dreadfulwater**. Oklahoma State University.

10:15   *PROTEIN KINASE A (PKA) REGULATION OF THE PHOSPHODIESTERASE REGA ON THE TRANSLOCATION OF THE TRANSCRIPTION FACTOR GTAC IN DICTYOSTELIUM. **Rebecca Lindley**. Oklahoma State University.

10:30   *ELUCIDATING THE FUNCTION OF Gα1 AND Gα2 IN DICTYOSTELIUM DISCOIDEUM. **Nicholas Kiger**. Oklahoma State University.

Section J: Biochemistry & Molecular Biology

8:30   **FLUORESCENT TAGGING OF PROTEINS TO STUDY DNA REPLICATION IN HUMAN CELLS. **Sarah Woller**. Northeastern State University.

8:45   *UNDERSTANDING THE CONSERVATION OF DOMAINS BOUND TO PROMOTER REGIONS IN THE INSULIN/TOR PATHWAY IN DROSOPHILA. **Hannah Shaver**. Oklahoma Christian University.

9:00   *FUNCTIONAL ANALYSIS OF 2O14. **Garrett Jones and Aaron Parrott**. Oklahoma Christian University.

9:15   *DNA BARCODING OF LIFE COMMONLY FOUND ON EAST CENTRAL UNIVERSITY'S CAMPUS. **Brenna Hefley**. East Central University.

9:30   *FUNCTIONAL ANALYSIS OF 3H04. **Cole McDonald, Emmaline Prinz, and Trey Smith**. Oklahoma Christian University.

9:45   *AKT1: TOO FLY TO BE MODIFIED. **Bethany Paris**. Oklahoma Christian University.

10:00   *THE USE OF DIFFERENTIAL SCANNING CALORIMETRY TO MEASURE PROTEIN DENATURATION OF HEME-BINDING PROTEINS HBP1 AND HBP2. **Kaylee Craig**. Cameron University.

10:15   *UNDERSTANDING GENE EVOLUTION OF THE INSULIN PATHWAY THROUGH SYNTENY. **Caroline Schwab and Jazmin Snyder**. Oklahoma Christian University.

10:30   *DNA BARCODING PROCEDURES DISPLAY DIFFERENTIAL SUCCESS IN A CURE BASED EXPERIMENT ACROSS TWO KINGDOMS. **Cuishan Deng**. East Central University.

Section L: Math, Computer Sci., & Statistics

8:30   AN INITIAL EXPLORATION OF GRAPHS, MATRICES, AND TIC-TAC-TOE. **Michelle Lastrina**. East Central University.

8:45   THE PROBLEM OF POINTS AND ALTERNATING ADVANTAGE. **Andrew Wells**. East Central University.

9:00   GRAPH CLASSIFICATION VIA HEAT DIFFUSION ON SIMPLICIAL COMPLEXES. **Mehmet Aktas**. University of Central Oklahoma.

9:15   VISUALIZING YOUR DATA. **Nicholas Jacob**. East Central University.

9:30   SUPPORTING WEAK SUPERVISION ON HEALTHCARE TIME SERIES DATA. **Rittika Shamsuddin**. Oklahoma State University.

9:45   **PREDICTING DRUG-DRUG INTERACTIONS USING META-PATH BASED SIMILARITIES. **Farhan Tanvir**. Oklahoma State University.

10:00 **PROXIMITY BASED COMPRESSION FOR NETWORK EMBEDDING. **Muhammad Ifte Khairul Islam**. Oklahoma State University.

10:15 *A LITERATURE REVIEW OF NETWORK NOISE MODELS. **Jitendra Chaudhary**. East Central University.

10:30 *EFFECTS OF NOISE ON LARGE SCALE REAL WORLD NETWORKS. **Jacob Talkington**. East Central University.

10:45 *ANALYSIS OF PUBLIC'S CONCERNS ON COVID-19 USING TWITTER POSTS. **Maxim Khanov**. Oklahoma State University.

11:00 *COVID-19 TRAVEL VISUALIZATIONS. **James Norman and Jacob Mantooth**. East Central University.

11:15 *INFLUENTIAL NODES DETECTION ON COMPLEX NETWORKS VIA NETWORK TOPOLOGY. **Sidra Jawaid**. University of Central Oklahoma.

11:30 *EXPLORING THE EFFECTS OF BIASING ON AMPLIFICATION. **Ethan Strickler**. East Central University.

11:45 **AN AUTOMATED QUALITY MEASURE OF SENTENTIAL PARAPHRASES. **Thanh Duong and Robert Owens**. Oklahoma State University.

12:00 *DEVELOPING A PREDICTIVE MODEL FOR UNDERSTANDING THE CLIMATE CHANGE IN THE STATE OF OKLAHOMA. **Emmanuel Akinwale**. Oklahoma State University.

Section N: Biomedical Sciences

8:30   COMPOUND OSW-1 INHIBITION OF SSRNA VIRUSES, INCLUDING CORONAVIRUS. **Earl Blewett**. Oklahoma State University - Center for Health Sciences.

8:45   ENHANCEMENT OF DRUG-METABOLIZING ENZYMES—STUDIES IN THE LITERATURE AND RECENT LABORATORY STUDIES USING CARBOXYLESTERASE, PROCAINE ESTERASE, ANILINE HYDROXYLASE, AND GLUCURONYLTRANSFERASE ASSAYS—RELEVANCE AND PHARMACOLOGICAL AND TOXICOLOGICAL IMPLICATIONS. **William Luttrell**. Oklahoma Christian University.

9:00   IDENTIFICATION AND CHARACTERIZATION OF A SECRETED PEPTIDE-CONTAINING POLYSACCHARIDE WITH SELECTIVE CANCER CELL CYTOTOXICITY. **William Ranahan**. Oral Roberts University.

9:15   **POTENTIAL OF PHARMACEUTICAL INTERVENTION IN PLATELETS AND CANCER POSITIVE FEEDBACK LOOP. **Zitha Redempta Isingizwe**. University of Oklahoma Health Sciences Center.

9:30   *ATTENUATION OF ANGIOMOTIN EXPRESSION VIA CRISPR IN TRIPLE-NEGATIVE MAMMARY EPITHELIA. **Riley Andrews**. Oral Roberts University.

9:45   *EFFECT OF PHENYLALANINE, RETINOIC ACID, RETINAL, AND CITRAL ON PROLIFERATION OF O9-1 MOUSE CRANIAL NEURAL CREST CELLS. **Nazka Nurbyek and Michaela Vance**. University of Central Oklahoma.

10:00   *ANALYSIS OF CARDIAC TERATOGENICITY OF PHENYLALANINI USING THE AVIAN MODEL: THE ROLE OF THE RETINOIC ACID PATHWAY. **Kayvan Noori and Lauren Watkins**. University of Central Oklahoma.

10:15   *GENETIC INVESTIGATION OF THE IMPACT OF SINGLE NUCLEOTIDE POLYMORPHISM (SNP) ON CAFFEINE METABOLISM. **Olga Castaneda and Kirsten Carpenter**. Southwestern Oklahoma State Universtiy.

Abstracts of the 2020 Virtual Technical Meeting of OAS

(*Undergraduate Presenter, **Graduate Presenter)

Akinwale, Emmanuel and Courtney William (Oklahoma State University)

*DEVELOPING A PREDICTIVE MODEL FOR UNDERSTANDING THE CLIMATE CHANGE IN THE STATE OF OKLAHOMA.

Motivated by major challenges arising from the rapid change in the climate behavior around the world, the goal of this research project is to develop a predictive model for understanding the climate change in the state of Oklahoma using a common programming language called python. To this end, we study the last fifty years of historic climate data in the state of Oklahoma collected by the National Oceanic and Atmospheric Administration. To build a robust predictive model, we first need to clean the data to minimize the errors in them such as some missing dates then; we consider three main forecasting models, including the moving average scheme, the standard exponential smoothing, and Holt-Winters exponential smoothing. After implementing preliminary data cleaning and data preparation steps, we train each of the three models to tune their parameters. In the next step, we validate the best model within each category on the climate data of the recent few years. It was shown that the Holt-Winters model fits the Oklahoma climate data the best. This finding is further utilized to forecast the change of climate in Oklahoma in next few years. In addition to the developed predictive model, implementing a decomposition scheme, we discover that the average monthly temperature in Oklahoma has been consistently decreasing in the past few decades, particularly, in the 90s. This also proved that global warming was not the correct terminology to describe the change in the Oklahoma's climate. This research project is supported by Oklahoma Louis Stokes Alliance for Minority Participation (OK-LSAMP), conducted by the two undergraduate research scholars, Emmanuel Akinwale and Courtney Williams, and under the supervision of Dr. Farzad Yousefian a faculty member at the School of Industrial Engineering and Management in Oklahoma State University.

Aktas, Mehmet and Esra Akbas (University of Central Oklahoma)

GRAPH CLASSIFICATION VIA HEAT DIFFUSION ON SIMPLICIAL COMPLEXES.

In this presentation, we will introduce how we use heat diffusion on simplicial complexes on the graph classification problem in vertex-labeled graphs. Our main goal is to classify the graphs comparing their higher-order structures thanks to heat diffusion on their simplices. We first represent vertex-labeled graphs as simplex-weighted super-graphs. We then define the diffusion Frechet function over their simplices to encode the higher-order network topology and finally reach our goal by combining the function values with machine learning algorithms. Our experiments on real-world bioinformatics networks show that using diffusion Frechet function on simplices is promising in graph classification and more effective than the baseline methods. To the best of our knowledge, this paper is the first paper in the literature using heat diffusion on higher-dimensional simplices in a graph mining problem. We believe that our method can be extended to different graph mining domains, not only the graph classification problem.

Ali, Christie[1], Hannah Shaver[1], Lindsey J. Long[1], Laura Reed[2] ([1]Oklahoma Christian University; [2]Genomics Education Partnership (GEP), University of Alabama)

*INCREASING DIVERGENCE DOWN THE INSULIN PATHWAY SUPPORTED BY THE INSTABILITY OF GENOMIC NEIGHBORHOODS IN EIF4E1.

The insulin/TOR (IT) pathway is a regulator in cell and organism growth. Although the function of genes within this pathway are defined, it is unclear how the position of proteins in the signaling transduction pathway affects the levels of functional constraint of the gene sequence evolution. In order to examine this, genetic divergence of a eukaryotic initiation factor gene, eIF4E1, and a downstream gene, Akt1, were annotated across multiple *Drosophila* species and compared to the orthologs in *Drosophila melanogaster* to establish synteny. Previous researchers hypothesized that evolutionary constraint increases in genes that are further downstream in the IT pathway. Based on this hypothesis, eIF4E1 should be more conserved compared to the Akt1 gene which is downstream of eIF4E1. Conversely, we found eIF4E1 was more diverged when compared to Akt1 in the majority of species. With similar results from multiple species of *Drosophila*, it is highly likely that the genes lower in the IT pathway are more diverged than the preceding genes. Based on collaboration with other researchers, the most common cause of this increasing divergence was the instability of the genomic neighborhoods. In the future, other genes can be tested within different pathways to determine if divergence increases downstream in pathways other than IT pathway.

Andreev, Victor, Shannon Straub, and Mark Fishbein (Oklahoma State University)

**SHARED GENETIC VARIATION BETWEEN *ASCLEPIAS SPECIOSA* TORR. AND *A. SYRIACA* L.: GEOGRAPHIC AND GENOMIC EXTENT, AND PROBABLE CAUSE.

Asclepias speciosa (showy milkweed) and *A. syriaca* (common milkweed) are very closely related species that are known to hybridize. It is believed that extensive gene flow between these species has altered their morphology and genetic makeup, but the genomic and geographic extent of hybridization between these species have never been evaluated. In addition, there is another process, Incomplete Lineage Sorting (ILS), that can create patterns of genetic variation similar of that of hybridization. Hybridization and ILS are not mutually exclusive, however their relative contribution into shared genetic variation between species can be estimated by comparison of mean levels of genetic diversity and degree of differentiation in sympatric and allopatric populations of *A. speciosa* and *A. syriaca* coupled with admixture analysis. Preliminary study of gene flow in a range-wide sample of *A. speciosa* and *A. syriaca* using 5507 SNPs showed that most of the analyzed *A. speciosa* individuals demonstrate relatively high amount of introgression, while the amount of introgression in *A. syriaca* is low. Presence of syriaca-specific alleles in *A. speciosa* can be traced at least as far as Montana and Utah. At the same time, introgression in *A. syriaca* is mostly restricted to the hybrid zone. Comparative analysis of differentiation and genetic variation in sympatric and allopatric populations of *A. speciosa* and *A. syriaca* revealed that the observed pattern of shared genetic variation is consistent with introgressive hybridization.

Andrews, Riley and William Ranahan (Oral Roberts University)

*ATTENUATION OF ANGIOMOTIN EXPRESSION VIA CRISPR IN TRIPLE-NEGATIVE MAMMARY EPITHELIA.

Breast cancer is the most commonly diagnosed form of cancer among women living in the United States, and it is characterized by uncontrolled cell growth in either the lobules or ducts of the breast tissue. Additionally, breast cancer accounts for the second highest number of cancer deaths, only trailing behind lung cancer. Current efforts to treat this form of cancer include various combinations of chemotherapy, mastectomy, radiation, and endocrine therapy; however, there is still a need for treatments with increased selectivity. Use of the CRISPR/Cas9 gene-editing tool is a method that could be used to directly target cancer cells. This gene-editing tool is guided to the appropriate sequence through complementary small guide RNA (sgRNA) that can be designed for any gene of

interest. Angiogenesis, which is required in order for tumor cells to survive, is the process in which new blood vessels are formed from pre-existing vessels, and Angiomotin (AMOT) is directly involved in this process. Additionally, various studies have found that Amot enables the proliferation of mammary epithelia through the activation of extracellular signal-regulated kinases (ERK1/2). Therefore, Amot is thought to be a putative oncogene involved in breast cancer. The current study focused on reducing Amot expression in tumorigenic MDA-MB-468 cells via CRISPR. Cancer cells were transfected with varying guide RNA (gRNA) sequences and varying concentrations of CRISPR-containing DNA constructs. qPCR data suggested that the gRNA sequence "Amot 174" was most effective at reducing Amot mRNA transcripts. Amot mRNA reduction correlated with a decrease in proliferating cell nuclear antigen (PCNA) mRNA transcripts, suggesting a decrease in cell viability. Follow up studies will include Western blotting to confirm reduction in Amot protein, cell viability assays to confirm cytotoxicity, and end-point PCR to confirm editing of the Amot gene.

Aranda, Ramee and Jeffery A. Hadwiger (Oklahoma State University)

**DEFINING FUNCTIONAL REGIONS OF THE *DICTYOSTELIUM* ERK1 AND ERK2 MAPKS USING CHIMERA ANALYSIS.

The amoeba *Dictyostelium discoideum*, has been a model organism for studying signal transduction pathways because many of the signaling proteins, such as MAP kinases, function in mammalian signaling pathways. *Dictyostelium* has two MAPKs, Erk1 and Erk2. Erk2 is an atypical MAPK required for chemotaxis and multicellular development and Erk1 is a typical MAPK that regulates cell aggregate size and developmental kinetics. There is not much known about the regulation or function of atypical MAPKs in any eukaryote but earlier studies have shown that Erk2 is activated within 30 seconds after chemoattractant stimulation and Erk2 function is required for Erk1 activation. Shuttling of a transcription factor, GtaC, from the nucleus to the cytoplasm after stimulation with the chemoattractant cAMP or folate requires Erk2 function. Our goal is to understand the regions of the Erk1 and Erk2 that are responsible for the specificity of these MAPKs. By creating chimeras of the two MAPKs through PCR and assembly technology, we plan to map regions of functional specificity for each MAPK. The chimeric MAPKs will be expressed in erk2- and erk1- mutants to test for Erk2 and Erk1 function.

Benedict, Alexa and Vijayakumar Somalinga (Southwestern Oklahoma State Universtiy)

*CLONING AND OVER-EXPRESSION OF SSA_0908, A PUTATIVE ENAMINE DEAMINASE FROM *STREPTOCOCCUS SANGUINIS*, A PATHOBIONT INVOLVED IN INFECTIVE ENDOCARDITIS.

Streptococcus sanguinis is a pathobiont typically associated with healthy oral biofilms in humans. In susceptible populations, *S. sanguinis* is the major cause of subacute infective endocarditis. Several studies have established the importance of adhesion to cardiac vegetation during infection, but the persistence and survival mechanisms of *S. sanguinis* during blood transit and in vegetations remains unclear. Amino acid metabolism may play an important role in *S. sanguinis* persistence during infection but can lead to formation of toxic enamine intermediates that can inhibit pyridoxal phosphate containing enzymes. A common mechanism by which enamine intermediates are neutralized is by enzymatic inactivation by enamine deaminases (RidA). RidA proteins have also been found to play a critical role in the virulence of several important bacterial pathogens. Recently, we identified a RidA homolog, SSA0809 in *S. sanguinis* using computational methods that showed both sequence and structural similarity to several well-characterized bacterial enamine deaminases. The goal of this study is to clone and over-express *S. sanguinis* SSA0809 for biochemical and structural analysis. Codon optimized SSA0809 was synthesized and cloned into pUC57 vector by Genscript (NJ,

USA). The SSA0809 gene was digested out of pUC57 vector and cloned into pET28a plasmid using traditional cloning strategies. The sequence verified construct was then transformed into *E. coli* BL21(DE3) and over-expression was induced with isopropyl-β-thiogalactoside in LB broth at 20C. SSA_0809 purification was done using immobilized metal affinity chromatography and was analyzed using SDS-PAGE. Using BLAST analysis we identified a ~13.5 kDa RidA homolog from *S. sanguinis* that has not been previously characterized. PCR analysis and subsequent DNA sequencing revealed that SSA0809 was successfully cloned into pET28a plasmid. Protein over-expression and solubility analysis revealed a ~15 kDa band indicating that SSA0809 was over-expressed and soluble under the conditions tested. Furthermore, SSA0809 was purified using IMAC for structural and biochemical studies.

Bishop, Kelsey (University of Central Oklahoma)

**WILL YOU STILL LOVE ME TOMORROW? SOCIOMETER THEORY AND SEXUAL SELF-ESTEEM.

Self-esteem is more than a general self-evaluation of self-worth. It is intertwined with our psychosocial nature and changes in self-esteem are related to our interpersonal relationships and our self-perceptions within different relationships. Traditional theoretical perspectives of self-esteem are static and fail to fully capture its intricacies; such as why changes in self-esteem regarding one psychosocial domain (like familial relationships) do not necessarily cause changes in self-esteem regarding another domain (like sexual relationships). Sociometer theory presents an avenue for examining self-esteem as a complex, active system and for exploring changes in domain-specific self-esteem such as sexual self-esteem. The present study proposes to examine changes in sexual self-esteem from a sociometer theory perspective. Participants will first be exposed to primes related to sexuality/sexual experiences (e.g., positive sexuality condition vs. negative sexuality condition) by completing a scramble-sentence task. After completing the priming scramble-sentence task, they will complete an evaluative conditioning procedure using a lexical decision task in which participants will be subliminally presented with the words I, me, or myself before positively and negatively sexually evaluative words and non-words. Finally, participants will complete two subscales (sexual self-efficacy and sexual esteem) of the Multidimensional Sexual Self-Concept Questionnaire (MSSCQ) and the Rosenberg Self-Esteem Scale. The predicted outcomes include a medium effect on sexual self-esteem such that those in the negative sexuality prime condition will respond faster to the negatively sexually evaluative words during the lexical decision task while those in the positive sexuality prime will respond faster to positively sexually evaluative words. It is also predicted those in the positive sexuality prime condition will have higher scores on the MSSCQ subscales while those in the negative sexuality prime condition will have lower scores on the subscales.

Bittner, Steven and Elizabeth Bergey (University of Oklahoma)

**DRIVERS OF THE STABILITY OF DIATOM, MACROINVERTEBRATE, AND FISH COMMUNITIES.

Understanding what drives community stability of rivers is important in understanding how anthropogenic environmental change affects the persistence of ecological function. We explored factors that influence community stability among years for diatom, macroinvertebrate, and fish communities in 72 rivers across the USA. We calculated community stability of each taxon group by computing the average Bray-Curtis dissimilarity among timepoints for each individual site. We used generalized additive modeling and interpretable machine learning to identify factors that explained variation in and prediction power of community stability of each taxon group. Fish communities were the most stable, followed by macroinvertebrates; diatom communities were the least stable. The variables associated with stability varied among these taxa groups. The difference in variables

explaining difference in stability among taxa groups may be due to differences in generational times and both the timescales and spatial scales at which they experience disturbance.

Blewett, Earl L.[1], B.J. Reddig[1], Brett Roberts[2], and Anthony Burgett[2] ([1]Oklahoma State University Center for Health Sciences; [2]University of Oklahoma Health Sciences Center)
COMPOUND OSW-1 INHIBITION OF SSRNA VIRUSES, INCLUDING CORONAVIRUS.

The compound OSW-1, used at 1 - 30 nM concentrations, was shown to significantly inhibit the growth of many (+) ssRNA viruses. OSW-1 is a natural compound that extracted from the bulbs of the Giant Chincherinchee plant Ornithogalum saundersiae. The OSW-1 used in this study was synthesized in the laboratory of Dr. Burgett. The viruses tested were Enterovirus D68, Coxsackievirus A9, Coxsackievirus B2, Coxsackievirus B5, Coxsackievirus B6, Human Rhinovirus-1B and Feline Coronavirus. When cells were infected with virus then treated with OSW-1, viral growth was inhibited by as much as 4 logs. OSW-1 also significantly inhibited virus growth when the cells were prophylactically treated with the compound then infected with virus. We show that as a treatment, OSW-1 worked at much lower concentrations than other anti-enterovirus compounds such itraconazole. We also show that OSW-1 will work prophylactically to inhibit virus infection and itraconazole will not.

Brown, Kellan and Sanjiv K. Jha (East Central University)
*COVALENT FUNCTIONALIZATION OF DEFECTIVE GRAPHENE AND CARBON NANOTUBES BY BENZYNE: A DENSITY FUNCTIONAL THEORY STUDY.

We performed density functional theory calculations to study the covalent functionalization of pristine and defective graphene and carbon nanotubes (CNTs) with benzyne. Our calculations were carried out using the Quantum ESPRESSO electronic-structure package. Graphene sheets were modeled using 4x4, 5x5, and 6x6 hexagonal supercells containing 32, 50, and 72 carbon atoms, respectively. Armchair and Zigzag CNTs were modeled with periodic supercells containing 128 to 160 carbon atoms. Stone-Wales (SW) defects in carbon nanomaterials were created by rotating C-C bonds by 90° about their center, whereas the double vacancy (DV) defects were created by removing two adjacent carbon atoms from graphene and CNTs. The binding energies of benzyne functionalized graphene and CNTs were examined in cases of graphene and nanotubes containing no surface defects, containing Stone-Wales defects, and containing double vacancy defects. Our calculated results indicate that the presence of structural defects enhances the binding of benzyne to the surfaces of graphene and carbon nanotubes. 1Supported by OK-LSAMP and the McNair Scholars Program. 2The computing for this project was performed at the OU Supercomputing Center for Education & Research (OSCER) at the University of Oklahoma.

Bryhan, Douglas (East Central University)
SPECTRA OF SOLID STATE AND TRADITIONAL LIGHTING SOURCES COMPARED.

The introduction of white light solid state illumination has recently caused significant concerns to be voiced over potential health effects due to the relatively high intensity of blue light around 450 nm. Spectra from various sources were obtained using an Ocean Optics "Red Tide" UV-VIS spectrometer and compared to provide a sense of perspective in the debate over the safety of this new technology.

Carpenter, KirstenOlga Castaneda, and Muatasem Ubeidat (Southwestern Oklahoma State Universtiy)

*GENETIC INVESTIGATION OF THE IMPACT OF SINGLE NUCLEOTIDE POLYMORPHISM (SNP) ON CAFFEINE METABOLISM.

SNPs are single base-pair mutations in a particular region of DNA. In the human genome, SNPs appear approximately every 300 bases on average. If the human genome is 3.1 billion bases, that means there are approximately 10 million SNPs! Because SNPs can occur anywhere in the genome, they can have dramatic effects on protein expression and function or no effect at all. Caffeine is a widely used drug by 90% of the world population on a daily basis with 150 million regular coffee drinkers in the United States alone. Coffee consumption is beneficial. It makes us energized in the morning and showed linked to a decreased risk of type 2 diabetes, Parkinson's and Alzheimer's diseases, and tea drinking has been linked to a lower risk for some cancers. Too much caffeine can also have negative effects. Some people become jittery after drinking a single cup of coffee, while others can drink several cups of strong coffee Part of that variability and not wake up a bit. Is it genetics? Is it adaptation to caffeine? We know caffeine is primarily metabolized by the liver enzyme cytochrome P450 1A2 (CYP1A2). Our goal is to produce a PCR product for accurate sequencing of the targeted sequence in the small population. An accurate single Nucleotide Polymorphisms (SNPs) for each subject will be achieved. We will be looking for a SNP in an intron of DNA for CYP1A2. This SNP (rs762551) has been linked to how fast CYP1A2 metabolizes caffeine in those of each ethnic group.

Chaudhary, Jitendra (East Central University)

*A LITERATURE REVIEW OF NETWORK NOISE MODELS.

Network science is the study of complex systems using the techniques of graph theory. Networks from various applications are considered including: computer networks, biological networks, telecommunication networks, and social media networks. I will present a literature review of some of the different types of noise models used for networks. Upon comparison of these noise models it is

clear that there is no single best model of network noise, it highly depends on the network application. For example, meaningfully modeling noise on social networks is inherently different than noise modeling on road networks. I have also investigated the relationship between stability/instability of networks under noise and the structure of the network according to various centrality measures by running simulations on Schooner, a supercomputer at the Oklahoma University Supercomputing Center for Education and Research (OSCER).

Clark, Terence and J. Adam Randell (University of Central Oklahoma)

**WORTH NOT FIGHTING FOR: HOW THE COOLIDGE EFFECT REDUCES AGGRESSION.

Research shows that aggression is one method of deterring would-be poachers (Buss, 1988; Buss & Shackleford, 1997). Due, in part, to this association, research also suggests that aggression is semantically (Mussweiler & Forster, 2000) and motivationally (Griskevicius et al., 2009) related to sex. For example, being primed with sex-relevant words make aggression words easier to identify (Mussweiler & Forster, 2000), and priming mating motives tends to increase aggression (Ainsworth & Maner, 2012; 2014). Therefore, we expected that participants' willingness to aggress against potential mate poachers would vary as a function of their sexual frequency with their partner. Further, as sexual vigor, and potentially the motivation to copulate, declines after repeated copulation with the same partner (i.e., Coolidge effect; Buss, 2016), we suspected that the tendency to aggress against poachers would decline with growing relationship age, and presumed infrequency of sexual contact grew. Although data collection is still in process, an initial examination of the data revealed the expected pattern. Specifically, those in younger (-1 SD) relationships were more willing to aggress against a potential poacher (compared to a none mate poaching offender) than were those in older (+1 SD) relationships.

Craig, Kaylee and Kyle Moore (Cameron University)

*THE USE OF DIFFERENTIAL SCANNING CALORIMETRY TO MEASURE PROTEIN DENATURATION OF HEME-BINDING PROTEINS HBP1 AND HBP2.

Protein folding and unfolding events are mapped based off of their thermal denaturation point (T_m), where the amount of unfolded and folded protein is in equilibrium. Here we use Differential Scanning Calorimetry, or DSC, to measure the heat flow of heme binding proteins against a TBS reference buffer. In this study, the entropy and enthalpy of protein denaturation of Hbp1 and Hbp2 from the pathogenic organism Listeria monocytogenes was calculated based on their respective T_m values. The goal of this study is to investigate the entropy, enthalpy, and T_m values for both proteins in the presence and absence of heme in order to determine the role of heme in protein stability. Protein stability is important when choosing new therapeutic targets. Hbp1 and Hbp2 are potential therapeutic targets since they act as virulence factors when causing infection.

Deng, Cuishan, Brenna Hefley, Alisha Howard (East Central University)

*DNA BARCODING PROCEDURES DISPLAY DIFFERENTAL SUCCESS IN A CURE BASED EXPERIMENT ACROSS TWO KINGDOMS.

DNA barcode has become a common technique to identify specimens at the species level. Despite this ubiquitous use, various techniques used in extraction vary by reagent or mechanical recipe and may also be variable by species examined. The experiment presented is a concentration comparison of proteinase addition to facilitate cellular extraction of organelle DNA. DNA was extracted from the cricket and plant samples. PCR was performed to amplify the DNA strand, I review the result using agar gel electrophoresis. The amplified PCR product was then purified and sent it to be sequenced.

My result shows that cricket specimens do not match expected DNA sequences. In contrast, the plant specimen has a DNA sequence that returns results consistent with expected matches. Overall, these results provide a good differential to compare procedure success across extraction techniques and specimen differences.

Dreadfulwater, Stormie, Nicholas Kiger, and Jeffrey A. Hadwiger (Oklahoma State University)
*ANALYSIS OF GA1 AND GA2 AND THEIR ROLES IN CELL SIGNALING.

Dictyostelium discoideum is a model organism that allows us to study cell movement and development in an organism similar to that in animal cells. As in animal cells, *Dictyostelium* has G protein-coupled receptors that are stimulated by chemoattractants and subsequent signaling leads to many cellular responses, which includes cell movement. Previous studies have demonstrated that chemotactic responses to cAMP are mediated through cell surface cAMP receptors and the Gα2 G protein. Removing Gα2 impairs cAMP chemotaxis but not other responses to cAMP such as activation of the Erk2 MAP kinase and the translocation of the GtaC transcription factor, suggesting another G protein might compensate for the loss of Gα2. The related G protein, Gα1, could potentially have functions similar to Gα2 but little is known about the role of the Gα1 subunit in chemotactic responses. The Gα1 gene was disrupted to create gα1- cells and these were analyzed for the ability to chemotaxis to folate and cAMP. The gα1- cells reacted to folate or cAMP with movement similar to wild-type control cells suggesting that Gα1 function is not required for this movement. The translocation of the GtaC transcription factor in cells lacking the Ga1 subunit was similar but not identical to wild-type cells suggesting the Ga1 subunit may contribute to the shuttling of GtaC. These results suggest that both GGa1 and Ga2 play a role in responses to cAMP.

Owens, Robert, Thanh Duong, and Thanh Thieu (Oklahoma State University)
**AN AUTOMATED QUALITY MEASURE OF SENTENTIAL PARAPHRASES.

Measuring quality/fluency of sentential paraphrasing is a challenging task that traditionally requires human annotation. By building learning-to-rank machine learning models, we present a novel method that works automatically and balances two conflicting criteria: semantic similarity and lexical diversity. Using machine translation features including edit distance, BLEU, ROUGE, and cosine similarity, we built models to measure quality of differentiation between a paraphrase and its reference sentence. Extrinsic evaluation on STS Benchmark and ParaBank Evaluation datasets resulted in a model ensemble with moderate to high accuracy. We applied our method on both small benchmarking and large-scale datasets as resources for the community.

Duong, Thanh, Robert Owens, and Thanh Thieu (Oklahoma State University)
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Elkins, Courtlyn and Nora Gayzur (University of Central Oklahoma)
**PERPETRATOR CHARACTERISTICS AND EYEWITNESS MEMORY.

Eyewitnesses are individuals to witness a crime or a traumatic event. In psychology, we have known the memory that eyewitnesses have are not completely reliable due to several factors, such as personality, attachment, or personal biases. In general, individual differences between eyewitnesses may account for some of the problems in eyewitness memory, including own-age bias. Own-age bias is defined as individuals better recognizing individuals closer in age to themselves (e.g., a child would be better at recognizing other children's faces than older adult faces). With this knowledge, this study examines the intersection between own age biases and eyewitness testimony. Recognizing the impacts of own-age bias on eyewitness memory is important because it could affect the accuracy of a witness' memory. The accuracy of a witness' memory has important implications as a false memory could lead to the misidentification of an innocent individual. While there has been much research on the topic of eyewitness memory and age effects, there are several conflicting views as to which age group has a stronger own-age bias. Therefore, the purpose of this study is to determine which age group shows a stronger bias and how we can overcome that. Another goal of this study is to develop a better understanding of how the individual differences of eyewitnesses and perpetrator characteristics influence their memory when witnessing a crime or some stressful event, this is especially important for older adults. With the increase in the Baby Boomer generation, older adult eyewitnesses are projected to become more prevalent than in past generations. Thus, furthering our knowledge on the influences of eyewitness memory, age-effects, and source memory problems in older adults could allow researchers to find ways to improve eyewitness memory and accuracy.

Ellsworth, Elyse, Melissa Sadir, and Elizabeth Bergey (University of Oklahoma)
**MODELING THE DISTRIBUTION OF A CRITICALLY ENDANGERED TURTLE.

The Central American river turtle (*Dermatemys mawii*) is a Critically Endangered species endemic to Belize, Guatemala, and the Yucatan Peninsula region of Mexico. This turtle is culturally important, but defining the exact range is hampered by the fully aquatic nature of this species. Improved range and habitat suitability information is crucial to targeting conservation programs to protect critical habitat areas and implement policy improvements. Here, we used MaxEnt to model habitat suitability across the current range using several environmental variables. The model shows the limited amount of suitable habitat in this region, with approximately 30% of the suitable habitat falling within 5km radius of human settlements. This model is useful in determining where conservation efforts are best concentrated for protection and reintroduction programs.

Erskine, Arlann, J Adam Randell, and Jeff Seger (University of Central Oklahoma)
**HOW LIFE HISTORY STRATEGIES SHAPE ENDORSEMENT OF CIVILIZING FORCES.

Life History Theory argues that organisms vary in the strategies they adopt to cope with life's challenges. Slow life strategists (SLS) begin investing in reproductive effort relatively later in life, while fast life strategists (FLS) begin investing in reproductive effort relatively sooner in life (Kaplan & Gangestad, 2005). Organisms are thought to adopt faster life strategies when raised in unstable and unpredictable environments. In humans, these life history strategies have been found to have a variety of cognitive and motivational correlates. Most pertinent to the current hypothesis, is FLS' tendency to purse more antagonistic relationship with their groups, while SLS' tend to pursue more mutualistic relationships with their groups (Figueredo et al., 2018). We expect that this motive to pursue more mutualistic relationships with one's groups, would motivate SLS to endorse those forces they believe are responsible for providing stability. Pinker (2011) has argued that these civilizing

forces (Elias, 1939) differ between the American North, and the American South and West. Specifically, Pinker argues that a large centralized government served this civilizing purpose in the American North, while religious groups and family groups served this purpose in the American South and West. Therefore, in an initial correlational examination, we seek to examine whether SLS (more so than FLS) endorse the civilizing force of the region in which they were raised. Namely, we expect SLS raised in the American North will endorse large centralized government more so than SLS in the American South or West. Alternatively, we expect that SLS raised in the American South and West will endorse local government and familial and religious institutions more so than SLS raised in the American North. While we expect similar general patterns among FLS, we expect FLS will endorse all civilizing forces to a lesser extent than will their SLS counterparts.

Friske, Rebekkah (Oklahoma State University)
**ISOLATION OF FUNGAL EXTRACELLULAR VESICLES TO HELP IDENTIFY GENES INVOLVED IN EV MECHANISMS.

Extracellular vesicles (EVs) are membrane bound particles present in all domains of life. The presence of EVs can be detected through isolation techniques, yet there is still little known regarding the mechanisms and genes in control of how EVs are packaged intracellularly, and how they traverse thick cell walls of some organisms, such as fungi. This research focuses on isolating EVs from the fungus Trichoderma reesei in order to determine the cargo carried by the vesicles, the mechanism for how the vesicles pass through the fungal cell wall, and whether the vesicles are deposited to the outside of the cell or have a target destination, such as a neighboring cell for intracellular communication. Vesicles were isolated and detected using an ultrafiltration, PEG precipitation, dynamic light scattering (DLS) analysis, and TEM. Liquid chromatography tandem mass spectrometry will be utilized to determine the composition of the outer membrane and cargo within vesicles. Once the biochemical composition is determined, genes can start to be identified and mutated to observe the effect on the quantity of EVs produced. This research provides evidence for a topic that is not currently well understood and exhibits methodologies to better understand fungal extracellular vesicles.

Goerend, Camille and Vijayakumar Somalinga (Southwestern Oklahoma State Universtiy)
*CLONING AND OVER-EXPRESSION OF SSA_0908, A PUTATIVE SUBSTRATE BINDING PROTEIN FROM *STREPTOCOCCUS SANGUINIS*, AN OPPORTUNISTIC PATHOGEN INVOLVED IN INFECTIVE ENDOCARDITIS.

Introduction: *Streptococcus sanguinis* is a pathobiont associated with healthy oral biofilms and is the leading cause of infective endocarditis in humans. *S. sanguinis* expresses a variety of cell surface proteins, most of which still remain uncharacterized. One such cell-surface protein with unknown function is SSA_0908, which is annotated as a single-pass transmembrane protein with similarities to ABC transporter substrate binding proteins (SBP). The goal of this study is to clone and over-express *S. sanguinis* SSA_0908 for functional and structural characterization. Methods: BLAST analysis was used to identify SSA_0908 gene in *S. sanguinis*. The SSA_0908 gene was cloned into pET28a plasmid using traditional cloning strategies. The sequence verified construct was then transformed into *E. coli* BL21(DE3) and over-expression was induced with isopropyl-β-D-thiogalactoside in LB broth at 20°C. SSA_0908 purification was done using immobilized metal affinity chromatography (IMAC) and was analyzed using SDS-PAGE. Results: Using BLAST analysis we identified a 36.6 kDa SSA_0908 protein from *S. sanguinis* that showed high homology to SBP's from Clostridium difficile CD0873 and S. pneumoniae SP1069. PCR analysis and subsequent DNA sequencing revealed that SSA_0908 was

successfully cloned into pET28a plasmid. Protein over-expression and solubility analysis revealed a 36.6 kDa band indicating that SSA_0908 was successfully over-expressed and soluble under the conditions tested. Furthermore, SSA_0908 was successfully purified using IMAC. Conclusion: Sequence analysis of SSA_0908 showed two possible homologs, one being protein SP1069 from S. pneumoniae and the other protein is CD0873 from C. difficile. While the SP1069 is an uncharacterized substrate binding protein, CD0873 is a substrate binding protein involved in amino acid transport. Expression analysis revealed that the protein was successfully over-expressed and soluble. Furthermore, we were able to purify SSA_0908 using IMAC, which will be used for biochemical and structural studies.

### Hefley, Brenna and Dwight L. Myers (East Central University)

*COMPUTATIONAL THERMOCHEMICAL RESULTS FOR GASEOUS BORON HYDROXIDE USING THE G3MP2 COMPOSITE METHOD.

There is an ongoing interest in the thermodynamics of gaseous hydroxides of boron because of their formation when boron nitride (BN) is exposed to high temperature environments where water vapor is present. Boron nitride can react with oxygen to form B_2O_2 or B_2O_3:

$2BN(s) + O_2(g) \rightarrow B_2O_2(s) + N_2(g)$ (1)
$2BN(s) + 3/2O_2(g) \rightarrow B_2O_3(s) + N_2(g)$ (2)
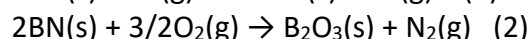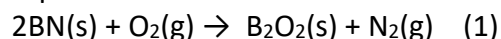
Accurate thermochemical data on the $B(OH)3(g)$ species are needed. Both theoretical and experimental data are useful. We are performing a computational study of boron hydroxide species. The software we are using is the GAMESS ab initio package. Geometry of the molecule and vibrational frequencies have been computed at the 6-311 G level for input to the G3MP2 Method. We are using the reaction:

$BF3(g) + 3 H_2O(g) \rightarrow B(OH)_3(g) + 3 HF(g)$ (3)
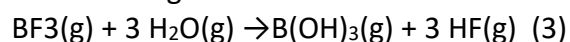
Results will be compared to experimental and theoretical results from the literature.

Hefley, Brenna, Cuishan Deng, and Alisha Howard (East Central University)

*DNA BARCODING OF LIFE COMMONLY FOUND ON EAST CENTRAL UNIVERSITY'S CAMPUS.

DNA barcoding is commonly used in many fields of biology to determine what type of fish was caught, what microbe, or fungi was isolated from a collection in the field, or a random cricket that was jumping around on a college's campus. For this experiment, DNA barcoding was used to determine what species of plant and cricket was collected. A generic DNA extraction protocol, which claims it works best for plants, was explored. This claim led to two hypotheses, a null and alternative hypothesis. The null hypothesis is that it works the same for both samples. The alternative hypothesis is that it will work better on the plant sample. PCR was followed by gel electrophoresis to view the results of amplification. The cricket PCR product, which produced a band, was then purified and sent to be sequenced. Results show some interesting differences in amplification but also in sequencing success. The plant sample did not produce a PCR product; therefore, I can reject the null and alternative hypothesis. The cricket sample did not produce a viable DNA sequence to determine the species.

Hinkle, Theresa[1], Chelsea Iluno[1], E. Ann Nalley[1], and Etienne Grau[2] ([1]Cameron University; [2]Université de Bordeaux, France)

*SYNTHESIS OF POLYURETHANES FROM VEGETABLE OILS USING A GREEN ONE-STEP, ONE-POT ROUTE TO CYCLIC CARBONATES.

As recent literature indicates, microwaves are quickly becoming an accepted tool for investigators in the organic laboratory. Microwave synthesis enables reactions to proceed more rapidly with greater yields than many conventional techniques. In parallel, there is a growing concerned about the isocyanate chemistry used to produce polyurethanes.. However, the conventional synthesis of cyclic carbonate requires two-step procedure: epoxidation of double bond followed by carbonation. In this research, we investigated the use of microwaves to synthesize cyclic carbonate from natural products such as soybean, sunflower and corn oils in one-pot, one-step reaction. These monomers can then be converted to polymers by reacting the cyclic carbonate with diamines. Thus we are able to create a polymer from natural products using green chemistry synthesis. We will compare the efficiency of microwave/ conventional synthesis of polymers.

Isingizwe, Zitha Redempta and Doris M. Benbrook (University of Oklahoma Health Sciences Center)
**POTENTIAL OF PHARMACEUTICAL INTERVENTION IN PLATELETS AND CANCER POSITIVE FEEDBACK LOOP.

Significance: High platelet counts and advanced stage of ovarian cancer go hand-in-hand in promoting each other in a feed-forward loop that results in coagulation and chemotherapy resistance. Objective and Hypothesis We sought to develop an experimental model of the positive interactions between platelets and cancer cells and test the hypothesis that interference with platelet clotting will inhibit this interaction. Approach: The contribution of platelets to cancer or normal epithelial cell spheroid's size and density were evaluated using a magnetic 3D cancer spheroids assay. Viability of these spheres was evaluated using MTT and SRB cytotoxicity assays. The shear-free platelet aggregation assay was performed in the presence of cancer cells to evaluate their contribution to platelets stimulation. Furthermore, we evaluated possible interruption of this feed-forward loop using antiplatelet agents: aspirin—a cyclooxygenase (COX)-1 and -2 inhibitor, celecoxib—a selective COX-2 inhibitor, clopidogrel—an ADP binding inhibitor, dipyridamole—an ADP uptake inhibitor, eptifibatide—a platelet's GP IIb/IIIa inhibitor, and prostacyclin—a platelet aggregation inhibitor. Results: Incubation of platelets with cancer spheroids as they are forming decreased the size and density of the spheres in less than 15 minutes of exposure. Cytotoxity assays indicated that these spheres were live and viable. Western blot analysis indicated that the process was independent of E-Cadherin, N-cadherin or occludin. Incubation of cancer cells with platelets caused clumping of platelets in a cancer cells number dependent manner. Pre-treating platelets with up to a 1mM of aspirin, clopidogrel, dipyridamole, and prostacyclin did not prevent cancer cell-induced aggregation, unlike celecoxib, which prevented aggregation at high concentrations, and eptifibatide, which was able to prevent aggregation at low concentrations as 0.1 µM. Conclusions: The positive interaction between platelets and cancer cells can be mimicked in co-culture conditions. This interaction appears to involve platelets GPIIb/IIIa binding, but not prostaglandins, E- and N-cadherin or occludin.

Islam, Muhammad Ifte Khairul[1], Farhan Tanvir[1], Ginger Johnson[2], EsraAkbas[1], and Mehmet Emin Aktas[3] ([1]Oklahoma State University; [2]University of Tulsa; [3]University of Central Oklahoma)
**PROXIMITY BASED COMPRESSION FOR NETWORK EMBEDDING.

Network embedding that encodes structural information of graphs into a low-dimensional vector space has been proven to be essential for network analysis applications, including node classification and community detection. Although recent methods show promising performance for various applications, graph embedding still has some challenges; either the huge size of graphs may hinder a direct application of the existing network embedding method to them, or they suffer

compromises in accuracy from locality and noise. In this paper, we propose a novel Network Embedding method, NECL, to generate embedding more efficiently or effectively. Our goal is to answer the following two questions: 1) Does the network Compression significantly boost Learning? 2) Does network compression improve the quality of the representation? For these goals, first, we propose a novel graph compression method based on neighborhood similarity that compresses the input graph to a smaller graph with incorporating local proximity of its vertices into super-nodes; second, we employ the compressed graph for network embedding instead of the original large graph to bring down the embedding cost and also to capture the global structure of the original graph; third, we refine the embeddings from the compressed graph to the original graph. NECL is a general meta-strategy that improves the efficiency and effectiveness of many state-of-the-art graph embedding algorithms based on node proximity, including DeepWalk, Node2vec, and LINE. Extensive experiments validate the efficiency and effectiveness of our method, which decreases embedding time and improves classification accuracy as evaluated on single and multi-label classification tasks with large real-world graphs

Jacob, Nicholas (East Central University)

VISUALIZING YOUR DATA.

Telling a story with data is of utmost concern to the data scientist and anyone that collects data. A well constructed data visualization can express many data points and help tell the story. We look to historical examples and modern computational techniques to discuss what makes a great visualization in the age of big data.

Jawaid, Sidraand Mehmet Emin Aktas (University of Central Oklahoma)

*INFLUENTIAL NODES DETECTION ON COMPLEX NETWORKS VIA NETWORK TOPOLOGY.

Identifying influential nodes in complex network is an important graph mining problem that has wide applications in many areas such as market advertising and rumor controlling. Nodes in a network can have varying roles in information diffusion. In this research project, we use the diffusion Frechet function (DFF), a function that leverages network topology and is robust to noise in data, to identify the most influential nodes in networks. We apply our method to various real-world network datasets to identify influential nodes. Its performance is then compared to that of the classical graph-theoretic centrality measures using the Susceptible-Infected-Recovered (SIR) simulation model. Our experimental results suggest that our method is promising in influential nodes detection and more effective than the classical centrality measures.

Jones, Garrett, Aaron Parrott, and Lindsey Long (Oklahoma Christian University)

*FUNCTIONAL ANALYSIS OF 2O14.

Enzymes are essential for nearly all biochemical reactions within living organisms and the function of any given enzyme is dependent upon its structure, which is determined by the amino acid sequence of the peptide or peptides making up the protein. In this research, the enzymatic function and classification of the novel protein 2O14, was determined using various bioinformatic tools and eventual kinetic testing. Initial investigation of 2O14 involved comparative analysis against proteins of similar structure but with known function. Because enzymatic structure is the primary determinant of enzymatic function, proteins with a high degree of structural similarity were used to hypothesize the potential function of 2O14. After progressively deductive comparisons that accounted for the primary, secondary and tertiary structural aspects of 2O14, it was suspected that the protein acted as a hydrolase and more specifically, either a lipase or carboxylase. Kinetic testing was then carried out

with specific substrates that would suggest either lipase or carboxylase activity. The reaction mixture containing 2O14 and a carboxylase substrate showed no catalytic activity whereas the reaction mixture containing the lipase substrate showed measurable substrate-enzyme association. This data suggests that the novel protein 2O14 does act as a hydrolase and more specifically, a lipase.

Keck, Lauren and James Moring (East Central University)

*FISH COMMUNITY COMPOSITION OF THE BLUE RIVER, OKLAHOMA AND ADJACENT SPRING RUNS WITH FOCUS ON RIFFLE MESOHABITATS.

The Blue River is one of the last remaining free-flowing rivers in Oklahoma. It is solely fed by groundwater discharge from the Arbuckle Simpson Aquifer. There are also many spring runs that feed into the Blue River. The purpose of this study was to compare what species of fish are found in the Blue River and these adjacent spring runs. Four sites were chosen for this study – two spring runs and two separate locations of the Blue River. Each location contained a series of two riffles, runs, and pools. The primary focus was laid on the riffle mesohabitats. Physical characteristics were taken using a multiprobe to compare the mesohabitats of the sites. Seining and an electrofishing backpack unit were utilized for fish collection. Overall, fifteen species of fish were found in the Blue River. Eight of these species were found in the adjacent spring runs. Comparisons were made between the riffle mesohabitats of the Blue River and adjacent spring runs regarding the relative abundance of fish species found and their physical characteristics.

Keck, Lauren and April Nesbit (East Central University)

ESCHERICHIA COLI GROWTH ON RHAMNONATE-ENRICHED MEDIA.

Escherichia coli is a commonly known bacteria that resides in the intestinal tract of both humans and animals. Previous studies have been performed to understand the various conditions that *E. coli* is able to grow. In this study, we wanted to understand how well *E. coli* would be able to grow in a rhamnonate-enriched media. Two strains of *E. coli* were used for this experiment – a wild type strain and a strain that contained the YfaX-his tag protein. Both strains were inoculated into tubes of glucose and glycerol to serve as controls and a third tube containing the rhamnonate-enriched media. Their growth was observed over seventy-six hours and periodically measured using a spectrophotometer. We found that *E. coli* had significant growth in glucose within the first six hours of the study. However, those inoculated into the glycerol and rhamnonate tubes showed little to no growth throughout experimentation.

Khanov, Maxim, Khaled Mohammed Saifuddin, and Akbas Esra (Oklahoma State University)

*ANALYSIS OF PUBLIC'S CONCERNS ON COVID-19 USING TWITTER POSTS.

Covid-19 or the novel Corona virus is a highly contagious disease, which has swept across the world as a pandemic. It has a high impact on public's psychology. In this work, we primarily developed an application in order to examine the state level public's concerns about Covid-19 by collecting and analyzing tweets related to Covid-19. The objective of this study is to quantify the emotional and psychological changes of people during the pandemic. We used popular methods of text sentiment and emotion analysis to track the impact of Covid-19 on people over time from starting of the pandemic to current date. The results could be useful for government officials for mitigating and analyzing policy impacts as well as medical professionals to better understand the public's concerns.

Kiger, Nicholas, Stormie Dreadfulwater, and Jeffrey A. Hadwiger (Oklahoma State University)

*ELUCIDATING THE FUNCTION OF Gα1 AND Gα2 IN *DICTYOSTELIUM DISCOIDEUM*.

For years, scientists have attempted to understand the molecular mechanisms that facilitate chemotactic movement-especially the immune cells (leukocytes) in mammals. Genetic analysis of mammalian cells can be problematic because they are diploid. In contrast, *Dictyostelium discoideum*, a haploid soil amoeba, is a useful model organism for the study of chemotaxis. Many of the processes by which *Dictyostelium* moves in response to external stimuli are understood, but others remain to be explained. cAMP is a chemoattractant secreted by *Dictyostelium* cells when food is scarce. In response to environmental cAMP, *Dictyostelium* cells will chemotax to one another and form a multicellular aggregate. Chemotaxis to cAMP requires one of two G protein-coupled receptors (Car1 and Car3), the Ga2 G protein, and a MAP kinase, Erk2. Erk2 is also required for the translocation of the transcription factor GtaC from the nucleus to the cytoplasm. Surprisingly, Ga2 function is not essential for the activation of Erk2 suggesting another G protein might share redundancy with this activation. Ga2 shares most similarity with Ga1 suggesting these G proteins might share some functional redundancy. Our goal is to elucidate the function of two of these components: Ga1 and Ga2. Strains lacking both the Ga1 and Ga2 G proteins were found not show normal translocation of GtaC in response to cAMP stimulation implying that Erk2 activation might be regulated by a combination of Ga1 and Ga2 function. To verify the role of Ga1, a Ga1 expression vector was constructed and used to complement mutations in the ga1 gene. Genes in plasmids are typically over-expressed due to increased copy number and this overexpression is currently being analyzed for effects on development and GtaC translocation.

Kisamore, Jennifer and Shannon L. Terry (University of Oklahoma-Tulsa)

BURNOUT AMONG SOCIAL WORKERS: A PRELIMINARY INVESTIGATION OF RECIPROCAL WORK-FAMILY SPILLOVER.

Background: According to the Job Demands-Resource Model, employees are likely to experience burnout when the demands of their jobs exceed their available resources (Demerouti et al., 2001). Furthermore, according to Spillover Theory (Zedeck, 1992), positive or negative experiences in a major life domain (e.g., work) can spillover and affect another major life domain (e.g., family life). Purpose: The current study is a preliminary investigation of how positive and negative work-life and family-life experiences spillover into the other domain to predict burnout among social workers. Design/Method: A cross-sectional online survey regarding experiences in work and family roles was completed by 160 social workers. Work-family enrichment (Kacmar et al., 2014), work-family conflict (Matthews et al., 2010), burnout (Schaufeli et al., 1996), role overload (Thiagarajan et al., 2006), work engagement (Schaufeli et al., 2017), and meaningfulness at work (Lips-Wiersma & Wright, 2012) were assessed. Shortened scales were used when psychometric evidence was available to support their use. Results: Two mediation models were tested. Models predicted that experiences in the workplace (job meaning and role overload) are related to reported levels of burnout. Work-family variables (work-family enrichment and work-family conflict) were examined as possible mediators of the relationships between job experiences and burnout. Both models were supported. Model 1 indicated that the relationship between job meaning and burnout was partially mediated by work-family enrichment; percent mediation was 16.69%. Model 2 showed that the relationship between role overload and burnout was partially mediated by work-family conflict; percent mediation was 43.81%. Conclusion: Results suggest a reciprocal relationship between work and family experiences. Positive and negative work experiences permeate an employee's family life. These positive and negative

family life experiences likely boomerang back to the workplace in the form of increased or decreased experiences of burnout.

Lastrina, Michelle (East Central University)

AN INITIAL EXPLORATION OF GRAPHS, MATRICES, AND TIC-TAC-TOE.

Many structures and relationships can be represented as a graph. In this talk, we convert a Tic-Tac-Toe grid into a graph G on nine vertices, with edges connecting vertices corresponding to adjacent grid spaces. With a fixed labeling of the vertices, we consider the adjacency matrix of this graph. This presentation looks at a preliminary exploration of the relationship between winning Tic-Tac-Toe combinations on the corresponding grid graph G and properties of the related adjacency matrices of the overall graph and corresponding winning subgraphs. What, if any, information can be determined? How are the matrices related? Is there a relationship between their eigenvalues? How do subgraphs of losing Tic-Tac-Toe combinations compare to these?

Lindley, Rebecca, Kierra Dixon, Rebecca Pegram, and Jeffrey A. Hadwiger (Oklahoma State University)

*PROTEIN KINASE A (PKA) REGULATION OF THE PHOSPHODIESTERASE REGA ON THE TRANSLOCATION OF THE TRANSCRIPTION FACTOR GTAC IN *DICTYOSTELIUM*.

The soil amoebae *Dictyostelium* is often used to study chemotactic responses because of its similarity with mammalian cells. When stimulated with the chemoattractant cAMP cell surface receptors trigger responses like the activation of G proteins, MAP kinases, cAMP dependent protein kinases (PKA) and the translocation of some transcription factors. During this response cells produce a burst of cAMP by activating adenylyl cyclases and inhibiting the phosphodiesterase of RegA and this leads to the activation of PKA. In the adaptation to this response, PKA can phosphorylate RegA to lower levels of cAMP. Mutations affecting the phosphorylation of RegA by PKA can impact the rate of development. The effect of these mutations in RegA on the translocation of a transcription factor, GtaC, is unknown. To test the impact of these RegA mutations on the translocation of GtaC, a GFP-GtaC reporter assay was used to monitor the location of GtaC in different RegA mutants. The shuttling of the GFP-GtaC reporter between the nucleus and cytoplasm in these mutants were similar but not identical to wild-type controls, suggesting the PKA phosphorylation of RegA is not essential but possibly contributes to the shuttling of this reporter.

Little, Peyton and E. Ann Nalley (Cameron University)

*GREEN CHEMISTRY SYNTHESIS OF IMIDAZOLES FROM 1,2-DIKETONES AND THEIR APPLICATIONS.

Allowing many chemical reactions to be completed within minutes, microwave technology has revolutionized preparative chemistry. Since it is a green technology, it is becoming widely adopted in both academic and industrial laboratories. Heterocycles are very important functional groups especially in medicinal chemistry. In this research heterocyclic precursors of pharmaceuticals are synthesized using microwave radiation. In this poster we describe the synthesis of a number of 2,4,5-trisubstituted imidazoles from 1,2-diketones and substituted benzaldehydes in the presence of NH4OAc. The imidazoles are purified and characterized using FTIR and NMR. These imidazoles were tested as possible catalysts in microwave synthesis of esters.

Love, SheKayla[1], Susmita Hazra[1], and Michael Fitzgerald[2] ([1]Cameron University; [2]Edith Cowan University, Australia)

*PHOTOMETRIC STUDY OF RR LYRAE STAR TV LYN.

In this research, we are presenting the light curve of RR Lyrae type variable star TV Lyn. This star is observed in the northern hemisphere and its coordinates are 113.38262, 47.80280. We have used data from Las Cumbres Observatory (LCO) which consists of a worldwide network of robotic telescopes. Photometric measurements were conducted using 0.4 meter SBIG telescopes. Depending on the color of a star, luminosity changes in different color filters. Our data consists of four filters, B (Blue), V (visual), I (Infrared), and Z (PAN-STARRS). Results show that this star has a variability period of 0.2407±0.002 days, metallicity -1.49, and located at a distance of 1362± 118 parsecs. We have used an estimate for the reddening E(B-V) = 0.05. This research is a part of a solar sibling project by an undergraduate student with the help of a faculty advisor and solar sibling project investigator.

Luttrell, William E. (Oklahoma Christian University)

ENHANCEMENT OF DRUG-METABOLIZING ENZYMES—STUDIES IN THE LITERATURE AND RECENT LABORATORY STUDIES USING CARBOXYLESTERASE, PROCAINE ESTERASE, ANILINE HYDROXYLASE, AND GLUCURONYLTRANSFERASE ASSAYS—RELEVANCE AND PHARMACOLOGICAL AND TOXICOLOGICAL IMPLICATIONS.

There are many exogenous agents than can alter the rates of drug metabolism, including a number of drugs themselves, cigarette smoke, ethanol, dietary factors, and exposure to foreign chemicals in the environment. This presentation will discuss the enhancement of drug metabolism by acetone, a common industrial solvent that many workers handle and have exposure through skin contact and inhalation. First, several in vitro studies reported in the literature will be summarized that describe kinetic studies in animals using liver microsomal tissues that show the enhancement of esterase and hydroxylase enzymes; as well as a study showing the induction of rat microsomal cytochrome P450 enzymes following exposure to acetone; and a study showing enhancement in vivo of drug oxidations following administration of acetone to rats. Second, a series of studies in my laboratory dealing with the effects of exposure to acetone on liver microsomal drug-metabolizing enzyme activities in mice will be summarized from carboxylesterase, procaine esterase, aniline hydroxylase, and glucuronyltransferase assays that have been performed in recent years. In general, enzyme activities were increased following pretreatment of mice 12 hours prior to removing their livers and also in microsomal tissue for in vitro studies. Third, to conclude the presentation, the relevance of the enhancement of drug-metabolizing enzymes and the pharmacological and toxicological implications will be discussed.

Mantooth, Jacob and James Norman (East Central University)

*COVID-19 TRAVEL VISUALIZATIONS.

Using John Hopkins Us county COVID-19 data we created several interactive visualizations. We have created an up to date county level map displaying total cases. We looked for correlation between travel and total cases and displayed this data with a scatter plot. Lastly, we created a choropleth looking at the entire United States and cases by county.

Maples, Randall and Mitchell Wallis (East Central University)

TRANSPORT AND RECOVERY OF ALUMINUM OXIDE NANOPARTICLES THROUGH LIMESTONE AND DOLOMITE PACKED COLUMNS.

Metal oxide nanomaterials are used in applications such as materials coatings, sensors and even drug delivery. Because of this, there is the increased potential of these engineered nanoparticles being released into the environment as contaminants when devices and materials containing these are disposed of. The environmental toxicity of such materials has not been fully fleshed out due to the variety of engineered nanoparticles. It is important to assess the short and long-term fate of these engineered materials and their distribution in groundwater. This study looked at the synthesis, transport and recovery of water dispersible functionalized aluminum oxide nanoparticles through packed stone columns as models for the local groundwater environment.

Marasini, Bishal and Sanjiv Jha (East Central University)

*FIRST-PRINCIPLES STUDY OF DEFECT FORMATION ENERGIES IN GRAPHENE AND CARBON NANOTUBES.

Presence of structural defects in graphene and carbon nanotubes (CNTs) can dramatically modify their properties. We apply first principles density functional computational method to study the formation energies of Stone-Wales defects and di-vacancies in carbon nanomaterials. Our calculations were performed using the Quantum ESPRESSO electronic structure package. Graphene sheets were modeled using 4x4, 5x5, and 6x6 hexagonal supercells containing 32, 50, and 72 carbon atoms, respectively. Armchair (10,10) CNT was modeled using a periodic supercell containing 160 carbon atoms. Stone-Wales defects in carbon nanomaterials were produced by the in-plane rotation of C-C bonds by 90° about their center, whereas the di-vacancy defects were created by removing two adjacent carbon atoms. Our calculated formation energies for studied supercells of graphene were in the range of 4.0 eV to 5.0 eV for Stone-Wales defects, and 6.0 eV to 7.0 eV for di-vacancies. In the case of the (10,10) CNT, the formation energy for Stone-Wales defects was calculated to be 4.39 eV. 1The computing for this project was performed at the OU Supercomputing Center for Education & Research (OSCER) at the University of Oklahoma (OU).

McDonald, Cole, Emmaline Prinz, and Trey Smith (Oklahoma Christian University)

*FUNCTIONAL ANALYSIS OF 3H04.

Proteins are the building blocks for all living material and are coded for by genetic sequences. They have various functions that are defined by the arrangement of amino acids that code for the assembly of their structures. Enzymes, a category of proteins, catalyze specific reactions at higher rates than what would occur naturally. This increased rate of reactions, facilitated by enzymes, allows for dynamic life. Knowing the functions of specific enzymes through their sequences can lead to the understanding of many different traits and further modification of the protein's function for specific purposes. The purpose of this study was to identify the classification and the functions of a previously unknown enzyme, 3H04. This experiment utilized bioinformatic tools to analyze 3H04, which determined how specific ligands interact with 3H04, confirmed the enzyme class (EC) and suggested potential arrangements of the active site that correspond to particular functions. The experiment then moved to laboratory investigation where the enzyme was expressed in *E. coli* cells and isolated for testing. The kinetic data of the purified protein sample was then examined against a multitude of substrates which effectively confirmed the data found in the bioinformatic investigation. Throughout the investigation, it was found that 3H04 is an alpha/beta hydrolase with esterase activity in EC 3. In addition to the information gained throughout this experiment, future exploration could be done in

order to determine a more specific function of 3H04 through identifying optimal substrates in order to potentially aid the medical industry in future pursuits.

Mitchell, LaDana and Alicia Limke-McLean (University of Central Oklahoma)

*POSITIVE THINKING AND ANXIETY.

No abstract provided.

Mitchell, LaDana and Vickie M. Jean (University of Central Oklahoma)

*EFFECT OF TIME MANAGEMENT ON THE SLEEP HABITS OF AN UNDERGRADUATE STUDENT.

No abstract provided.

Montalva, Jose (University of Oklahoma)

**SAFARI AT THE OKLAHOMA CITY ZOO AND BOTANICAL GARDEN.

Bees (Anthophila) are very important pollinators. They pollinate commercial crops (most of our food) and plants in the wild (including in your national parks, preserves, prairies, forests, deserts, etc.). Urban areas tend to have lower bee abundance and diversity. However, we know very little about bee diversity and abundance within Oklahoma, especially compared to neighboring states (Texas, Kansas, Missouri). Here, I describe several native bees and results from a survey conducted March to October 2020 at the Oklahoma City Zoo. We found a high diversity of native species for this urban environment, approximately 60 species in total were collected. This included accounts of endangered bumble bee species and new state records. We will briefly discuss outreach materials with the goal to educate the OKC Zoo guest about the importance of these pollinators.

Noori, Kayvan, Lauren Watkins, and Nikki J Seagraves (University of Central Oklahoma)

*ANALYSIS OF CARDIAC TERATOGENICITY OF PHENYLALANINI USING THE AVIAN MODEL: THE ROLE OF THE RETINOIC ACID PATHWAY.

Maternal Phenylketonuria (MPKU) is the result of exposure of high levels of phenylalanine (PHE) to the developing embryo of mothers with PKU. High levels of PHE can lead to cranial and cardiac developmental issues in the embryo. Previous studies in our lab revealed the Retinoid pathway as a potential mechanism for these defects. Transthyretin (TTR) is a gene of the retinoic acid pathway that is effected by an excess of PHE. The TTR gene is responsible for producing the protein called Transthyretin. This protein transports retinol in the retinoic acid pathway. The second gene of interest in this project is PlexinA2 and is also a gene effected by an excess of PHE. PlexinA2 is responsible for neural cell guidance and growth, specifically PlexinA2 is important in neural crest cell (ncc) migration. Disruption in the migration of nccs may lead to the cranial and cardiac defects observed in MPKU. The objective of this project was to clone a fragment of TTR and PlexinA2 RNA in order to transcribe a RNA probe. Cloning was done by dissecting chicken embryos and extracting RNA. RNA was then reverse transcribed and cDNA was used in PCR amplification of the two genes. The PCR product was extracted and cloned into the pGEM-T easy vector system through ligation of the DNA insert to plasmid. One Shot TOP10 chemically competent *E. coli* was transformed with the plasmid containing our gene insert. X-Gal was then used to select for bacterial colonies containing the DNA insert. Clonal PCR was conducted to confirm the presence of the insert. Further experiments are underway, including sequencing of the insert, RNA probe transcription, and insitu hybridization to understand the effect of excess of PHE on gene expression.

Lauren, Watkins, Kayvan Noori, and Nikki J Seagraves (University of Central Oklahoma)

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Norman, James and Jacob Mantooth (East Central University)

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Vance, Michaela, Nazka Nurbyek, and Nikki Seagraves (University of Central Oklahoma)

*EFFECT OF PHENYLALANINE, RETINOIC ACID, RETINAL, AND CITRAL 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]. Phe is a teratogen to the embryo 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, retinal, and citral, which is a known RA inhibitor. We conducted in-vitro proliferation assays on mouse neural crest cells o9-1, to determine the effect of Phe, RA, retinal, and citral 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 and retinal increase proliferation, and that citral decreases cell proliferation. In this way, Phe induced a similar response

to citral, 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.

Nurbyek, Nazka, Michaela Vance, and Nikki Seagraves (University of Central Oklahoma)
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Paris, Bethany[1], Susane Mihigo[1], Ali Christie[1], Hannah Shaver[1], Lindsey J. Long[1], Laura Reed[2] ([1]Oklahoma Christian University; [2]Genomics Education Partnership (GEP), University of Alabama)
*AKT1: TOO FLY TO BE MODIFIED.

The insulin pathway regulates blood glucose levels and influences growth and lifespan in *Drosophila* species as well as in other animals. However, not all portions of the pathway evolve at the same rate. In this study, a comparative genomics approach was used in order to determine the levels of conservation of two genes, Akt1 and eIF4E1, of the insulin pathway. This comparison was accomplished by sequencing these genes in a variety of different organisms in the *Drosophila* genus, assigning divergence scores based on factors such as basic gene structure and gene neighborhood, and viewing these scores in the context of the organisms' evolutionary relationship to D. *melanogaster*. Because eIF4E1 occurs later in the insulin pathway and interacts in other pathways besides the insulin pathway, it was hypothesized that it would be more conserved than Akt1. However, divergence scores indicated that Akt1 was the more strongly conserved of the two genes. Of note, Akt1 contains a non-traditional start codon that was also conserved throughout all species studied. These results raise questions about differential evolutionary rates within distinct portions of the insulin pathway.

Parks, Matthew, Cameron Kedy, and Casey Skalla (University of Central Oklahoma)

CONSISTENT PATTERNS IN 16S AND 18S MICROBIAL DIVERSITY FROM THE SHELLS OF THE COMMON AND WIDESPREAD RED-EARED SLIDER TURTLE (*TRACHEMYS SCRIPTA*).

Microbial communities associated with freshwater aquatic habitats and resident species are both critical to and indicative of ecosystem status and organismal health. Microbial diversity residing on freshwater turtle shells is poorly understood, although shells readily accumulate microbial growth and could carry representation of habitat-wide microbial diversity since they are in regular contact with multiple elements of freshwater environments. We applied 16S and 18S metabarcoding to characterize microbiota associated with external shell surfaces of 20 red-eared slider (*Trachemys scripta*) turtles collected from varied habitats in central and western Oklahoma, and ranging to southeast Iowa. Shell-associated microbial communities were highly diverse, with samples dominated by Bacteroidia and alpha-/gamma-proteobacteria, and ciliophoran alveolates. Alpha diversity was lower on turtle shells compared to shallow-water-associated environmental samples, likely resulting from basking-drying behavior and seasonal scute shedding, while alpha diversity was higher on carapace than plastron surfaces. Beta diversity of turtle shells was similarly differentiated from environmental samples, although sampling site was consistently a significant factor. Deinococcus bacteria and ciliophoran alveolates were recovered with significantly higher abundance on turtle shells versus environmental samples, while pathogenic bacterial taxa were variably more abundant between shell and environmental samples. Microbial communities from a single, shared-site collection of the ecologically similar river cooter (*P. concinna*) largely overlapped with those of *T. scripta*. These data add to a foundation for further characterization of turtle shell microbial communities across species and habitats, with implications for freshwater habitat assessment, microbial ecology and wildlife conservation efforts.

Parrott, Aaron, Garrett Jones, and Lindsey Long (Oklahoma Christian University)

*FUNCTIONAL ANALYSIS OF 2O14.

Enzymes are essential for nearly all biochemical reactions within living organisms and the function of any given enzyme is dependent upon its structure, which is determined by the amino acid sequence of the peptide or peptides making up the protein. In this research, the enzymatic function and classification of the novel protein 2O14, was determined using various bioinformatic tools and eventual kinetic testing. Initial investigation of 2O14 involved comparative analysis against proteins of similar structure but with known function. Because enzymatic structure is the primary determinant of enzymatic function, proteins with a high degree of structural similarity were used to hypothesize the potential function of 2O14. After progressively deductive comparisons that accounted for the primary, secondary and tertiary structural aspects of 2O14, it was suspected that the protein acted as a hydrolase and more specifically, either a lipase or carboxylase. Kinetic testing was then carried out with specific substrates that would suggest either lipase or carboxylase activity. The reaction mixture containing 2O14 and a carboxylase substrate showed no catalytic activity whereas the reaction mixture containing the lipase substrate showed measurable substrate-enzyme association. This data suggests that the novel protein 2O14 does act as a hydrolase and more specifically, a lipase.

Parsells, Denton and Ricky Cothran (Southwestern Oklahoma State Universtiy)

*SEXUAL SELECTION IN RESPONSE TO VARYING LEVELS OF CULTURAL EUTROPHICATION.

Sexually selected traits are expensive to build and maintain and thus are predicted to be dependent upon condition and useful for making decisions about potential mates. However, the condition-dependence of these traits is also expected to make them very sensitive to environmental change.

We explored patterns of sexual selection in populations of amphipods in the genus *Hyalella* exposed to varying levels of nutrient pollution. These amphipods were collected from nine natural lakes in NW Pennsylvania that have varying nutrient levels, which are suggestive of human induced change. These varying levels are most likely due to fertilizer runoff from local farms. We measured sexually dimorphic traits and control traits to examine whether the former were more sensitive to nutrient pollution. Higher levels of phosphorous, found in lakes with higher nutrient runoff, were predicted to lead to larger sexually selected traits, the posterior gnathopod (a claw-like trait) and second antenna. Nutrient pollution is expected to cause less variation between males and lead to weaker sexual selection which can in turn decrease the overall health of the population. This decrease is caused by females not being able to use these information-rich traits to choose among potential mates. This work is in progress and we will share the results we have to date at the meeting.

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

*PERCEIVING CHARACTERISTICS OF CHILD ABDUCTORS.

Priming is when information influences a person's thoughts or behaviors. A common way people are primed without noticing is from the media. Specifically, media coverage on child abduction cases has the potential to influence public perception. This project will provide awareness for how priming may affect perceptions of child abductions, which can be used to develop more robust prevention programs. Participants will complete an online survey which will include an experimental manipulation of information (a prime). Participants in the prime condition will be presented with a summary of a convicted child abductors criminal background, while participants in the control condition will only complete only the questionnaire. The online questionnaire will concern their perceptions of a child abductor's personal background and upbringing. It is hypothesized that the groups who receive a prime will answer differently based on that information provided in the prime.

Prather, Cole and Weldon Wilson (University of Central Oklahoma)

**GRAVITATIONAL RADIATION: MAXWELL-HEAVISIDE FORMULATION.

Using a gravitational analog to the Maxwell-Heaviside equations for electrodynamics, the Liénard–Wiechert potentials and fields are derived for gravitation along with radiation patterns and corresponding Larmor formulae for total radiated power. Due to attraction of like gravitational charges (masses) as opposed to repulsion of like electrical charges, the mass-density and current-density terms pick up a negative sign. This results in a sign change of the Poynting vector, indicating energy is gained by the field as opposed to energy being lost by the field in the case of electromagnetic radiation. The gravitational and co-gravitational fields, analogous to the electric and magnetic fields, respectively, behave as described by Lorentz. Like an electric charge, a gravitic charge (mass) in uniform motion produces a spherical field which contracts as its velocity approaches the speed of propagation. The speed of gravitational propagation is assumed to be equivalent to that of light, though this may not necessarily be true. For an accelerated mass, the resulting gravitational radiation mirrors the dipole pattern produced by an electric charge, similarly contracting at relativistic speeds. These results seek to further inquire on the nature of gravitational fields and the true speed of gravity.

### Prinz, Emmaline, Cole McDonald, and Trey Smith (Oklahoma Christian University)

*FUNCTIONAL ANALYSIS OF 3H04.

Proteins are the building blocks for all living material and are coded for by genetic sequences. They have various functions that are defined by the arrangement of amino acids that code for the

assembly of their structures. Enzymes, a category of proteins, catalyze specific reactions at higher rates than what would occur naturally. This increased rate of reactions, facilitated by enzymes, allows for dynamic life. Knowing the functions of specific enzymes through their sequences can lead to the understanding of many different traits and further modification of the protein's function for specific purposes. The purpose of this study was to identify the classification and the functions of a previously unknown enzyme, 3H04. This experiment utilized bioinformatic tools to analyze 3H04, which determined how specific ligands interact with 3H04, confirmed the enzyme class (EC) and suggested potential arrangements of the active site that correspond to particular functions. The experiment then moved to laboratory investigation where the enzyme was expressed in *E. coli* cells and isolated for testing. The kinetic data of the purified protein sample was then examined against a multitude of substrates which effectively confirmed the data found in the bioinformatic investigation. Throughout the investigation, it was found that 3H04 is an alpha/beta hydrolase with esterase activity in EC 3. In addition to the information gained throughout this experiment, future exploration could be done in order to determine a more specific function of 3H04 through identifying optimal substrates in order to potentially aid the medical industry in future pursuits.

Smith, Joe "Trey", Cole McDonald, and Emmaline Prinz (Oklahoma Christian University)
*FUNCTIONAL ANALYSIS OF 3H04.

Pustina, Uendi and Dwight L. Myers (East Central University)
*COMPARISON OF G3MP2 THERMOCHEMICAL RESULTS WITH HIGHER LEVEL THEORY RESULTS FOR SELECTED GASEOUS ALUMINUM HYDROXIDES.

There is an ongoing interest in the thermodynamics of gaseous aluminum hydroxides because of their formation when alumina (Al_2O_3) is exposed to high temperature combustion environments. Specific examples include Al_2O_3 protective scales on superalloys in gas turbines, high temperature coating with Al_2O_3 constituents in turbines, and refractory bricks in furnaces. It is known that combustion environments contain 3-10% water vapor. A high temperature degradation route for Al_2O_3 in these environments is:

$$Al_2O_3(s) + 3\ H_2O(g) \rightarrow 2\ Al(OH)_3(g) \qquad (1)$$
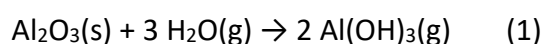
Accurate thermochemical data on the $Al(OH)_3(g)$ species are needed. Both theoretical and experimental data are useful. We are performing a computational study of aluminum hydroxide species. The software we are using is the GAMESS ab initio package. Geometry of the molecule and vibrational frequencies have been computed at the B3LYP/Dunning cc-pVTZ level for input to the G3MP2 Method. We are using the reaction:

$2\ AlF_3(g) + 3\ H_2O(g) \rightarrow 2\ Al(OH)_3(g) + 6\ HF(g)$ (2)
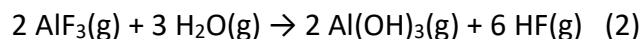
and the analogous reaction with aluminum chloride gas to compute the enthalpy of formation of Al(OH)3(g). Similar computations yield results for AlOH(g). This study is a comparison of the results obtained using the G3MP2 composite method with higher level methods using a CCSD(T) approach to calculate enthalpies.

Ranahan, William, Ursula Dinallah, Michael Estrada, and Victoria Glover (Oral Roberts University)

IDENTIFICATION AND CHARACTERIZATION OF A SECRETED PEPTIDE-CONTAINING POLYSACCHARIDE WITH SELECTIVE CANCER CELL CYTOTOXICITY.

Current standard cancer treatment therapies are often nonselective, resulting in damage to healthy tissues. Given the historical success of novel drug discovery from plant-derived compounds, the authors sought to identify cancer-cell selective compounds secreted from mushroom mycelia. Mushroom mycelia are under tremendous selection pressure. Mycelia must identify potential food sources, secrete compounds capable of breaking down potential food sources, and then absorb the nutrients. For mycelia, failure to identify and secrete appropriately results in death. With selection pressure in mind, mycelia were serially passaged on solid media containing decreasing nutrients and increasing amounts of cancer cells. Eventually, mycelia were grown on just cancer cells as a nutrient source. Secreted compounds produced by "trained" mycelia were collected and analyzed. Following identification, compounds were tested for cancer and non-cancer cell cytotoxicity. An ~1.2KDa peptide-containing polysaccharide was identified which showed selective cytotoxicity against the mammary epithelial cancer cell line MDA-MD 468, but not the non-tumorigenic mammary epithelial cell line MCF10A. In an effort to model an in-vivo environment, both tumorigenic and non-tumorigenic mammary epithelial cells were grown on a laminin-rich extracellular matrix (lrECM) and exposed to the secreted compound. Following a 48 hour incubation, a clearly selective phenotype was observed between tumorigenic and non-tumorigenic mammary epithelial cell growths. Future studies will focus on elucidating the mechanisms of selective cytotoxicity and expanding the types of cancer cell lines tested.

Reed, Daniel[1], Toby Nelson[1], Gabriel Cook[1], and Franklin R. Champlin[2] ([1]Oklahoma State University; [2]Oklahoma State University Center for Health Sciences)

*GRAM-POSITIVE ANTIBACTERIAL SPECTRUM OF A NOVEL MELANIN-INSPIRED ANTIMICROBIAL.

The Melanin-inspired core represents a novel compound having the intrinsic ability to act as scaffolding for functional groups which may possess antibacterial properties. The purpose of this study was to investigate the antibacterial potential of Melanin-inspired antimicrobial EIPE-1 and EIPE-HCl which are hydrophobic and hydrophilic, respectively. A standardized disk agar diffusion bioassay was employed to determine the susceptibility and resistance levels of twelve gram-positive and thirteen gram-negative bacteria to the nonpolar and polar EIPE derivatives. Turbidimetric growth curves were generated from batch culture growth kinetic analysis to provide preliminary mechanistic information. Five strains of *Staphylococcus aureus*, plus *Bacillus* subtilis and *Staphylococcus* epidermidis were found to be susceptible to the hydrophobic derivative EIPE-1, while other gram-positive and all gram-negative organisms exhibited resistant phenotypes at the potencies tested.

Batch cultural growth kinetics revealed EIPE-1 to cause immediate bacteriolysis of B. subtilis and S. epidermidis at a concentration of 0.2 µg/mL. The more polar EIPE-HCl derivative failed to inhibit growth of any of the organisms examined. These data support the conclusion that the hydrophobic EIPE derivative EIPE-1 possesses a gram-positive antibacterial spectrum and likely acts in a cytoplasmic membrane-directed manner. The susceptibility of two methicillin-resistant *S. aureus* strains suggests that its mechanism of action does not involve the penicillin-binding proteins of peptidoglycan biosynthesis targeted by mainstream β-lactam antibiotics. The uniform resistance of thirteen phylogenetically disparate gram-negative pathogens supports the notion that intrinsic outer membrane exclusion properties may play a role in the mechanism underlying their intrinsic phenotypic resistance. Further experiments will involve treating gram-negative organisms with an outer membrane permeabilizer in an attempt to increase the efficacy of EIPE-1 by chemical sensitization. Determining the mechanism of resistance to gram-negative organisms will be valuable for expanding the EIPE-1 spectrum and the development of other Melanin-inspired derivatives.

Risner, Jonathan Luke, Susmita Hazra, and Michel Fitzgerald (Cameron University)
*PHOTOMETRIC ANALYSIS OF RR LYRAE V494 SCO.

In this paper, we are presenting photometric analysis of a RR Lyrae type of variable star. These stars have low metallicity with mass and size like the Sun. They have a relatively low period about 0.2-1 day, makes them one of the most useful stars for exploring groups of stars that are similar to each other in terms of age and chemical composition. We are studying the RR Lyrae star "V494 Sco" located in the southern hemisphere with coordinates (265.2016, -31.5426). We are using the data from Las Cumbres Observatory (LCO) which has network of robotic telescopes located across different parts of the world. The data we are using are from SBIG (0.4 m) telescopes which has four different filters, B (blue), V (visual), I (infrared), and Z (PAN-STARRS). We have used advanced photometric techniques developed by Dr. Michael Fitzgerald & his team as a part of solar sibling project to study the light curves of SS For star. Results shows that this star has a variability period of 0.4271±0.00028 days using the standard deviation method. Further analysis of our data can provide us information on intrinsic and extrinsic variables of this star.

Rossignaud, Loïc and Susmita Hazra (Cameron University)
*SOLAR ACTIVITY AND ITS EFFECT ON EARTH'S MAGNETOSPHERE DURING SOLAR CYCLE.

Activity of our Sun varies through solar cycle with the occurrence of sunspot and solar flux. As the Sun progresses through its solar cycle and its activity increases, more number of sunspots occur and solar fluxes become more intense. The change in solar activity is related to the change in Earth's magnetosphere and space weather on Earth. Space weather plays a significant role in radio and satellite communication as well as GPS navigation. In this poster, we are presenting the sunspot and solar flux data for solar cycle 24 (11 years). During solar minima, sunspot number varies from 0 to 70 and solar flux varies from 60 SFU (Solar Flux Unit) to 100 SFU. During solar maxima, sunspot number varies from 70 to 150 and solar flux varies from 100 SFU to 150 SFU. We have used Kp and Dst index during this time Based on Kp and Dst index variation, we found seventeen geomagnetic storms during this time. Further research in this project can be used as a framework for future advancement in empirical modelling space weather for better radio and satellite communication.

Schwab, G. Caroline and Jazmin Snyder (Oklahoma Christian University)

*UNDERSTANDING GENE EVOLUTION OF THE INSULIN PATHWAY THROUGH SYNTENY.

This study focused on the evolution of the Insulin/TOR signaling pathway in *Drosophila* by investigating genetic divergence of eIF4E1 and Akt1—genes within the insulin pathway—across several *Drosophila* species. Web-based tools and bioinformatic data were used to annotate these genes. The gene architecture and genomic neighborhoods (synteny) of eIF4E1 and Akt1 in these species were compared to orthologous genes in D. *melanogaster*, which was used as the reference species. Ultimately, gene annotation data from classmates in several other *Drosophila* species was meta-analyzed to obtain a relatively comprehensive look at the evolution of these two genes across species. Results indicated higher genetic divergence in eIF4E1 compared to Akt1 in the 13 species analyzed.

Shamsuddin, Rittika and Balakrishnan Prabhakaran (Oklahoma State University)

SUPPORTING WEAK SUPERVISION ON HEALTHCARE TIME SERIES DATA.

Programming paradigms keep evolving to address different challenges such as big data, deep learning, etc. Weak supervision is one such paradigm that evolved to directly address the problem of limited availability of annotated/labeled data. Limited accessibility to annotated/labeled data is a big challenge in healthcare informatics research due to the need of domain expertise for annotations and labels. Thus, to facilitate the use of weak supervision on healthcare time series data, we are proposing to develop a weak label library, which will encompass a range of general purpose heuristics for identifying and characterizing common patterns in healthcare time series data. To test the practicality of this approach, we populate the library with three different heuristics and test them on five real time series healthcare data. We find that such a library for general purpose heuristics is not only promising, but also has the ability to handle very specific time series patterns.

Shaver, Hannah and Lindsey Long (Oklahoma Christian University)

*UNDERSTANDING THE CONSERVATION OF DOMAINS BOUND TO PROMOTER REGIONS IN THE INSULIN/TOR PATHWAY IN *DROSOPHILA*.

The insulin/TOR (IT) pathway is a regulator in cell and organism growth. Although the function of genes within this pathway are defined, it is unclear how the domains bound to promoter regions in the signaling transduction pathway affect the levels of functional constraint of the gene sequence evolution. In order to examine this, the evolution of promoter and intronic regions of genes close to foxo in the IT pathway were examined. The binding site of the forkhead box (foxo) binding motif was annotated in the InR promoter region across multiple *Drosophila* species and compared to the orthologs in *Drosophila melanogaster* to establish synteny and analyze sequence conservation. A dn/ds scoring system was used to determine how much the sequence diverged by calculating the extent those regions changed in comparison to D. *melanogaster*. The foxo sequence was found to be a well conserved binding motif across multiple *Drosophila* species in the IT pathway. In the future, other genes can be tested within different pathways to determine if the binding motifs in promoter regions are well conserved in pathways other than IT pathway.

Shepard, Lexie, Heather R. Ketchum, and Eric Bright (University of Oklahoma)

*IMPACT OF REARING DIET PREPARATION ON THE DEVELOPMENT OF THE SECONDARY SCREWWORM, *COCHLIOMYIA MACELLARIA* (DIPTERA: CALLIPHORIDAE).

Forensic Entomologists are experts at utilizing arthropod biology in criminal and civil cases. One of the most common applications is in determining the post-mortem interval (PMI), the time between

death and body discovery. While blowfly data is seen as one of the most accurate determinants of PMI, best practices used in research that supports it are far from standardized. One practice has been set by the American Board of Forensic Entomologists; the food source used to rear maggots, with pork, beef, and chicken given as options. While published studies are adhering to these guidelines, varying preparations of these diets are used to rear maggots. How the different preparations influence maggot development and therefore a PMI estimate is unknown. Hence, we sought to determine if there was a need to standardize diet preparation for developmental studies that use the data to determine PMI. We examined the effects of three preparations of beef liver on *Cochliomyia macellaria* (Diptera: Calliphoridae), secondary screwworm, maggot and pupal length and weight and adult weight. We placed 0.12g (approximately 940 eggs) of *C. macellaria* eggs on three different treatments of 50g beef liver (sliced, diced, and pureed). Pupae and adults reared on pureed liver weighed significantly more than other treatments. Pupae reared on pureed beef were also significantly longer than pupae from the other treatments. While overall maggot length and weight were not significantly different among the treatments, the growth rate of the maggots differed among the different treatments. The maggots reared on pureed beef grew the fastest while the maggots reared on the sliced beef grew the slowest. The significant difference in pupal and adult weights, pupal lengths, and larval growth rates demonstrates a need for the standardization of rearing diet preparation, especially in studies where the data will aid in PMI determination.

Slattery, Connor (Southwestern Oklahoma State Universtiy)

*PHENOTYPIC PLASTICITY IN *HYALELLA* AMPHIPODS ACROSS FRESHWATER SPRINGS.

Humans are causing rapid change to environments across the globe. These changes often happen too fast for populations to persist long enough to adapt. Some organisms display an ability to respond to changes to the environment within an individual's lifetime known as phenotypic plasticity. Phenotypic plasticity is the ability for a single genotype to produce multiple phenotypes depending on environmental conditions. Plasticity can allow populations to withstand environmental changes long enough for adaptation to occur. We tested if amphipods found in springs at Roman Nose State Park demonstrate phenotypic plasticity. We collected *Hyalella* amphipods from multiple spring's pools and runs as well as a sample of the invertebrate community from each spring to gain a better understanding of the differences in the environments. We then raised amphipods from multiple springs under common garden conditions to see if the offspring display trait differences compared to individuals collected from natural populations. The traits looked at are sexually selected and resource intensive, thus being good indicators of phenotypic reactions. We expected the amphipods to have phenotypic plasticity because they likely experience movement between at least two very different environments, the pool of the spring and the adjacent flowing run. We found that amphipods from the spring's pools and runs have different trait sizes, as well as pools and runs of some springs differ in their plastic responses. Amphipods are important for aquatic ecosystems due to them being a staple food source for many species, and measuring how they respond to environmental changes enable a better understanding of freshwater ecosystems.

Snyder, Jazminand G. Caroline Schwab (Oklahoma Christian University)

*UNDERSTANDING GENE EVOLUTION OF THE INSULIN PATHWAY THROUGH SYNTENY.

This study focused on the evolution of the Insulin/TOR signaling pathway in *Drosophila* by investigating genetic divergence of eIF4E1 and Akt1—genes within the insulin pathway—across several *Drosophila* species. Web-based tools and bioinformatic data were used to annotate these genes. The gene architecture and genomic neighborhoods (synteny) of eIF4E1 and Akt1 in these

species were compared to orthologous genes in D. *melanogaster*, which was used as the reference species. Ultimately, gene annotation data from classmates in several other *Drosophila* species was meta-analyzed to obtain a relatively comprehensive look at the evolution of these two genes across species. Results indicated higher genetic divergence in eIF4E1 compared to Akt1 in the 13 species analyzed.

Soto, Armando (University of Central Oklahoma)

*DATING DURING COVID-19: A LOOK INTO ACTIVITY ON DATING APPS AND ENGAGEMENT.

Introduction: In the current age of rapid use of technology, there are many ways in which one can engage in dating behaviors, even in light of the ongoing pandemic. This case study looks at one participant, referred to as Client C, in order to see if an increased usage of dating applications is associated with an increase in direct engagements with others. This hypothesis is based on the theory of mere exposure, which states that the more one is exposed to a stimuli, the more they will prefer it over time. Method: With the exception of being multi-racial, the participant is relatively generalizable to the population. Four main dating applications were used in this study: Tinder, Bumble, OKCupid, and Hinge. The participant recorded the amount of time spent on these apps each day, as well as the number of people they liked, directly messaged, things they bought on the apps, or any other important thoughts or actions. Results: One of the findings found was that there was more time spent on these applications compared to the client's baseline. Along with the increase in time spent came an increase in the number of people they liked on these applications. Not only that, but, in line with our hypothesis, there was an increase in the number of people Client C directly messaged, compared to the absence of such behavior in their baseline. Note: This study is currently a work in progress and subject to changes.

Spears, Bailey and Nathan Green (Northeastern State University)

*SYNTHESIS, SURFACE FUNCTIONALIZATION, AND ASSEMBLY OF GOLD NANORODS.

Gold nanorods (AuNRs) exhibit unique optical properties due to nanometer size and asymmetric dimension. AuNRs have recently been employed in numerous applications such as sensing, light-harvesting, and novel photonic materials. However, nanoscale spatial control between nanoparticles has been problematic, presenting barriers to develop promising energy transfer complexes. In this report, AuNRs were synthesized and coated in single-stranded DNA (ssDNA) for incorporation into hetero-nanoparticle aggregates. First, AuNRs were synthesized using a seed-mediated method and encapsulated in hexdecyltrimethylammonium bromide (CTAB). The verification of a specific aspect ratio was achieved using UV-Visible Spectroscopy and TEM imaging. The AuNRs were then recoated in ssDNA by displacing CTAB using a low pH technique followed by verification using gel electrophoresis. The ssDNA coating could then be leveraged to facilitate precise and customizable arrangements of nanoparticles by binding to a DNA-based nanostructure. The DNA nanostructures, so-called DNA origami, were computationally derived to self-assemble in solution and contain free-hanging complement strands to those on the AuNR. The DNA Origami was modified and modeled using software: Cadnano and ChimeraX. In future experiments, we aim to assemble the DNA origami structure in solution followed by placing AuNRs and silica dye-doped nanoparticles (SiNP) on the DNA origami structure to achieve a high-efficiency energy transfer system.

Strickler, Ethan (East Central University)

*EFFECTS OF DISTORTION ON AMPLIFIERS.

The purpose of this project is to explore the effects distortion has on amplifiers. Then we create differing biases in class B, class AB and class A amplifiers.

Strickler, Ethan (East Central University)

*EXPLORING THE EFFECTS OF BIASING ON AMPLIFICATION.

Three dimensional objects are often difficult to picture in one's mind, or create a two dimensional visualization. The purpose of this project is to explore ways to create these three dimensional objects for in-class learning during my calculus 3 class as an honors enrichment.

Talkington, Jacob (East Central University)

*EFFECTS OF NOISE ON LARGE SCALE REAL WORLD NETWORKS.

Network Science, as the name would imply, covers the field that deals with modeling complex systems as networks. It discusses a variety of network types, such as social, biological, and computational. It gives an in depth look into the technicalities of how the networks function. I plan to present experiments I conducted in relation to this field. The overall goal of this project was to observe the effects of noise on networks. Using the OU SCHOONER supercomputer, I added and removed edges and vertices to simulate noise in various networks. I used a uniform perturbation model for varying levels of noise in order to test the stability of networks based on their centrality rankings. We determine network stability by the the ranking of the top centrality vertices. Networks are classified as stable if the rankings are relatively unchanged and unstable when they exhibit drastic changes in rankings. The overall goal was to determine if the stability of a network can be predicted just by the original centrality distributions and without having to simulate a noise model which requires a massive amount of resources and time for simulation. I plan to share my findings in the presentation. We aim to develop a mathematical model that will classify stability based on centrality.

Tanvir, Farhan, Muhammad Ifte Khairul Islam, and Esra Akbas (Oklahoma State University)

**PREDICTING DRUG-DRUG INTERACTIONS USING META-PATH BASED SIMILARITIES.

DDIs indicates the event where a particular drug's desired course of action is modified when it's taken together with other drug(s). DDIs may hamper, enhance or reduce expected effect of either drug or at the worst possible scenario, cause an adverse side effect. While It is thus crucial to identify drug-drug interactions, it is quite impossible to detect all possible DDIs for a new drug during clinical trial. Therefore, many computational methods are proposed for this task. In this project We've proposed a novel method, Asclepius. This method takes into account drugs and other biomedical entities like drugs, proteins, pathways etc. for DDIs prediction. We've designed a heterogeneous information network(HIN) to model relations between these entities. Afterwards, we've computed the similarity among these entities using different meta-path as well as topological features. We've run extensive experiments to compare and evaluate the effectiveness of Asclepius with other methods. Results exhibit that Asclepius is quite effective in predicting new drugs as well as existing drugs.

Tayo, Benjamin O., Matthew B. Henry, and Mukesh Tumbapo (University of Central Oklahoma)

PHYSISORPTION OF DNA BASES ON NANORIBBONS FROM GRAPHENE, PHOSPHORENE AND SILICENE.

Graphene's success for DNA sequencing has shown that it is possible to explore other potential single- and few-atom thick layers of elemental 2D materials beyond graphene (e.g. phosphorene and silicene), and also that these materials can exhibit fascinating and technologically useful properties

for DNA base detection that are superior to those of graphene. Using density functional theory (DFT), we studied the physisorption of DNA bases on finite-size nanomaterials from graphene, phosphorene and silicene. We observe that binding energies of DNA bases using phosphorene nanoribbon are smaller compared to graphene and silicene devices. This shows that minimal sticking of DNA bases to phosphorene's surface is expected for phosphorene devices. Furthermore, nanoribbon devices from phosphorene show a characteristic change in the density of states for each base. The band gap of phosphorene is significantly changed compared to other nanomaterials (e.g., MoS_2, graphene, silicene, and h-BN) due to physisorption of bases on nanoribbon surface. Our findings show that phosphorene performs better than silicene and graphene, hence a promising material for DNA base detection using advanced detection principles such as transverse tunneling current measurement.

Weaver, Shelbie, Jessica Neuzil, and David Bass (University of Central Oklahoma)

**PRELIMINARY INVESTIGATION OF THE ECOLOGY OF HARRIS MUD CRAB IN LAKE TEXOMA.

Harris mud crab (*Rhithropanopeus harrisi*) was first reported in Lake Texoma in 2008 and its distribution at that time was documented. Since that time, very little research regarding this population has been conducted. Purposes of the current investigation are 1) document current distribution, 2) estimate population size, 3) record sex and individual measurements, 4) determine reproductive periods, and 5) note microhabitat preferences and any other pertinent ecological information. Six sampling stations have been established on the Oklahoma side of Lake Texoma in a transect from the OU Biological Station to near the Denison Dam. Sampling of each site began in August 2019 and will continue through July 2021. The average density of crabs at each site ranged from 0.0 crabs/m2 to 154 crabs/m2. No crabs have been found during the cooler months of the collections. Larvae were present in plankton samples during July and August, indicating reproduction occurs during the warmer months. Of the crabs returned to the laboratory, 75 were females, 155 were males and 11 were too immature to determine sex. Measurements including carapace width (1.3-14.5 mm), carapace length (0.7-10.8 mm), chela width (0.4-13.1 mm), chela length (0.2-13.0 mm), and dominant claw were recorded. Results from an independent study indicated 94% selected rock as a microhabitat over plants and sediments, confirming what was observed in the field. As this Lake Texoma mud crab project continues, it will be interesting to see if the trends from the first year continue through the second year of study.

Wells, Andrew (East Central University)

THE PROBLEM OF POINTS AND ALTERNATING ADVANTAGE.

An old probability result makes an elegant solution to the question of why different methods of alternating advantage in a two player game lead to the same outcomes. The connection is explained and then slightly extended to show certain methods can lead to different outcomes.

Williams, Karen (East Central University)

GROUND VERIFICATION OF NASA'S GPM PROJECT-A CONTINUATION STUDY.

The amount of precipitation has been predicted by the NASA and JAXA Global Precipitation Measurement (GPM) Project since 2014. The project began with tropical regions and has expanded to all regions of Earth. The precipitation predicted at one location by GPM is undergoing ground verification involving several entities; CoCoRaHS is one. I will compare five years of precipitation data at my location in this study. Previous studies of four years of predictive and actual precipitation data found that not only is the correlation of the two quantities decreasing but also the predictive power

as measured by a t-test comparing the two quantities is decreasing rapidly from p = .12 to p = .52 in the years 2015-2018.

Wilson, Weldon (University of Central Oklahoma)
NOVEL "DERIVATION" OF MAXWELL'S EQUATIONS FOR THE ELECTROMAGNETIC FIELD.

A novel "derivation" of Maxwell's equations for the electromagnetic field is presented. The equations for electrostatics are generalized to a time-dependent electric field in such a way that the magnetic field arises naturally. The only assumptions made are that (1) the differential form of Coulomb's law of electrostatics is also valid for a time-dependent electric field and (2) the phenomenological observations of the non-existence of magnetic monopoles and the existence of electromagnetic waves in empty space hold. These assumptions are sufficient to produce the usual Maxwell equations of electromagnetic field theory.

Woller, Sarah[1], Lydia Ostmo[1], Michael Smith[1], Shwetanshu Das[2], and Sapna Das-Bradoo[1] ([1]Northeastern State University, Broken Arrow; [2]University of Southern California)
**FLUORESCENT TAGGING OF PROTEINS TO STUDY DNA REPLICATION IN HUMAN CELLS.

DNA replication requires an intricate web of interacting proteins. Recent work in our lab with budding yeast has shown that MCM10 plays an integral role in functionality of POLE. Expanding on this research, we intend to investigate if the roles of MCM10 and POLE are conserved in human cells. In the current project, we have established HEK293 cell lines expressing green fluorescent protein (GFP)-tagged MCM10 and red fluorescent protein (RFP)-tagged POLE to study the dynamics of the interaction during the cell cycle. Using restriction enzyme digestion, ligation, transformation and sequence analysis, we have confirmed successful construction of GFP-tagged MCM10 and RFP-tagged POLE vectors. Protein expression of GFP-MCM10 and RFP-POLE in HEK293 was visualized by fluorescent microscopy. We are in the process of performing colocalization to visualize the interaction of MCM10 and POLE in human cells.