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Meeting  
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**Cover Photograph:** Tuskegee University College of Arts and Sciences in Tuskegee, Alabama hosted the 96<sup>th</sup> annual meeting proudly showing off their beautiful campus pictured above along with the Booker T. Washington Monument, Tuskegee University's most iconic campus landmark.

**Photo is courtesy of:** Dr. Prakash Sharma, Tuskegee University.

**Editorial Comment:**

Thank you for your continued support and patience as I adapt to my new role as editor.

Thanks!

*Brian Toone*

*Editor: Alabama Academy of Science Journal*

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## ABSTRACTS

### SECTION I. BIOLOGICAL SCIENCES

**Paper Session I**  
**Thursday Morning, 8:00 AM – 12:20 PM**  
**KCC Rooms F&G**  
**Gordon MacGregor & Brad Bennett, Presiding**

1. 8:00 am      **DISCOVERING OF NOVEL ANTI-TOXOPLASMOSIS DRUG COMBINATIONS.** *Daniel Abugri* and Aarian Huffman, Tuskegee University. Toxoplasmosis is one of the top neglected parasitic diseases that affects over 2 billion people globally, with over 60 million Americans chronically infected. Few drugs are available for the treatment of the acute stage (tachyzoites) infection. However, these drugs are limited in efficacy, safety and are very expensive. Thus, novel inhibitors are urgently needed for the treatment of acute and chronic toxoplasmosis. Here, we report the anti-*T. gondii* activity of apigenin-7-O-glucoside, curcumin, and quinoline-based compounds (hydroquinine, 8-hydroxyquinoline, and 4-hydroxyquinazoline) against *T. gondii* growth *in vitro*. In our first study, we identified apigenin-7-O-glucoside alone and its combination with quinoline-based compounds to inhibit *T. gondii* RH-YFP (type I) tachyzoites growth up to 80%. In the second study, we identified curcumin and its combination with quinoline-based compounds to remarkably inhibit *T. gondii* ME-49 (type II) strain growth. Interestingly, the combinations treatments were found to be effective in inhibiting parasites growth up to 60% at low micromolar concentrations. Very importantly, most of the individual compounds and their combinations were found to have minimal cytotoxic effects at 48 hours interaction. Overall, the data showed that the *T. gondii* RH-YFP (type I) as well as *T. gondii* ME-49 (type II) strains, known to affect most HIV-AIDS patients, could possibly be treated using these apigenin-7-O-glucoside-quinoline-based and curcumin-quinoline based combination therapies. Further studies are ongoing to decipher their mechanism(s) of action as well as determine their potency and safety *in vivo*.
2. 8:20 am      **\*\*g FUNCTIONAL ANALYSIS OF THYMIC NURSE CELLS IN LUPUS PRONE MICE.** *Montessa Mitchell* and E'Lashae Richards Scott, Sheryce Henley, Edeoba W. Edobor and Marcia Martinez, Tuskegee University. Introduction: Functional loss of thymic epithelial cells, including thymic nurse cells (TNCs), is believed to contribute to faulty education of self for thymocytes, resulting in autoreactive T lymphocytes whose response to self-antigens is a consistent feature of Systemic Lupus Erythematosus (SLE). Objective: To analyze TNC function in SLE prone mice. Method: NZBW TNCs were isolated, immortalized, and cloned. Immunocytochemistry and fluorescent microscopy were used to analyze clones for the ability to interact with CD4+/CD8+ (DP) thymocytes and for constitutive and induced expression of major histocompatibility complex (MHC) proteins. Clones were coincubated with DO 11.10 thymocytes bearing transgenic T cell receptors specific for cOVA 323-339 fragment. Thymocytes were collected, stained with Annexin V or Bcl2 antibodies, and analyzed by flow cytometry. TUNEL stain was used to observe apoptosis among thymocytes interacting with TNC clones. Results: Two clones were found to interact with DP

thymocytes, but only one expressed MHC class II proteins. NZBW clones consistently had less Annexin V or TUNEL positive thymocytes than BALB/c.

Conclusion: TNCs of lupus-prone mice appear to be functionally limited in their ability to induce apoptosis among DP thymocytes.

3. 8:40 am      \*\*g INTRATHYMIC NURSE CELL TRANSPLANT REDUCES MORBIDITY AND MORTALITY IN SLE-PRONE MICE. *Michael Henderson, Sheryce Henley and Marcia Martinez, Tuskegee University.* Introduction: Systemic Lupus Erythematosus (SLE) is a chronic, inflammatory, autoimmune disease characterized by tissue destruction resulting from the aberrant behavior of lymphocytes. Studies suggest that loss of self-tolerance associated with SLE leads to end-organ tissue damage and a high mortality rate. Functional loss of thymic epithelial cells, including Thymic Nurse Cells (TNCs), is believed to contribute to faulty self-education of T lymphocytes. We hypothesize that replacement of TNCs will ameliorate tissue damage and decrease mortality in SLE prone mice. Objective: To observe the effect of intrathymic TNC transplantation on tissue morphology and mortality in lupus-prone mice. Materials & Methods: Immortalized TNCs derived from BALBc mice were fluorescently labeled and injected into the thymi of twelve-week old NZBWF/1 mice. Untreated age-matched mice or saline-injected animals were used as controls. Serum was collected bi-weekly and urine every 4 weeks for analysis of anti-DNA antibodies and proteins respectively. Mice were also observed over time to assess changes in mortality and morbidity. Results: Mice that were recipients of intrathymic TNC transplants showed an increase in survival and median age at natural death. TNC recipients also showed a reduction in proteinuria and serum levels of anti-DNA antibodies when compared to control groups. Conclusions: Intrathymic transplantation of TNC's into lupus prone mice results in decreased mortality and may ameliorate some of the downstream effects contributing to kidney damage associated with SLE.
4. 9:00 am      \*\*u CYTOTOXICITY AND COMPLEXITY OF THE VENOM FROM *CTENUS HIBERNALIS*. *Jonathan Berkuta, Brad C. Bennett, and Robert A. Hataway, Samford University.* There is an ongoing need for therapeutic drug discovery, especially antibiotics and neuromodulatory compounds. Novel compounds within venom have shown promise in both basic and translational research, as demonstrated in neuropathological studies of epilepsy and stroke. Molecular consequences of toxins include the modulation of specific ion channels and regulation of signal transduction pathways. Spider venoms are multicomponent mixtures of small molecules, peptides and proteins, many of which function as toxins and have distinct molecular targets in prey. *Ctenus hibernalis*, a wandering spider native to Alabama, has venom possessing nearly 2000 components. From a previous proteomic study, the identities of many of these components could not be characterized. Also, it was unknown whether this venom would have cytotoxic effects in mammalian cell lines. In a previous study, raw venom was extracted and was found to significantly reduce the viability and compromise the morphology of C2C12 muscle cells. In an attempt to understand the components responsible for prey capture and morbidity, RNA from the venom glands was extracted for paired-end poly-A sequencing of the mRNA transcripts. A transcriptome was assembled and several potential toxin components were identified based on annotation and protein sequence analysis. Primers were designed for these components and four putative toxin genes have been amplified. These were subsequently cloned into an

expression vector in order to synthesize recombinant toxin. These will be used in cell culture studies to associate certain pathological effects with specific toxins and to identify bona fide molecular targets in prey.

5. 9:20 am       \*\*u AN IN-DEPTH EXAMINATION OF THE BLACK BELT TICKS AND THE PATHOGENS THEY HARBOR. *Anna Holycross* and Tracy Keener, University of West Alabama. In the past few decades, tick-borne diseases have become much more numerous and frequent across the United States, with approximately 300,000 cases presenting annually. There are currently sixteen known tick-borne diseases in the United States, with Lyme disease (*Borrelia*) being the most prominent. Tick borne diseases are the most common vector-borne illnesses in the United States currently, and their transmission is still not fully understood. Because tick borne illnesses mimic the flu, it can be a very arduous task to detect and diagnosis the various diseases. Due to the growing threat of these diseases, approximately 5,000 dollars was spent in the 2016 fiscal year to conduct research in order to combat these diseases, and this monetary amount is projected to dramatically increase over the next few years. Three of the most common tickborne diseases are Lyme Disease, Ehrlichia, and Rickettsia, each with its own vectors, symptoms, and geographical regions. Studies are currently being conducted to better understand the transmission, life cycle, and treatment for these diseases, but here have been no confirmed treatments or preventions thus far, and the research is in its infancy; however, vaccines and the use of biomarkers are at the forefront of this research and seems to be possible much-needed solutions to these tick-borne diseases.

**9:40 am COFFEE BREAK**

6. 9:50 am       \*\*u LAB ANIMALS AND HUMAN DIETS: WHAT CAN WE LEARN? *Anna Grace Ballard*, Sophie Bru, Benjamin Marsh, Jarod Lowe, Michael Williams, Chloe Childress, and Stephen Watts, University of Alabama at Birmingham. Laboratory research animals are generally fed diets that are formulated to support their dietary requirements. Over the last few decades, lab animals have often been fed diets that reflect ingredients, nutrients, or bioactive food component profiles associated with the human diet in an effort to understand how diet might contribute to overall organismal health and, as a consequence, human health. Recently, zebrafish have been identified as effective models for dietary-induced obesity and related comorbidities. In this study, we surveyed college students and acquired a typical meal item, freeze-dried the material, and ground into a powder. These meals were fed to zebrafish for a period of 14 weeks ad libitum (6 to 10 % of body weight per day) and compared to a control diet formulated to provide all daily nutritional requirements. Fish were fed twice daily in 2.8 L tanks containing 14 fish, 4 tanks per diet. Survival was high (>96%) in all diets. Highest weight gain was seen in fish fed the formulated diet, the diet of which had the highest P:E ratio (134 mg/kcal). Lowest weight gain was found in those fed Ramen noodles (P:E of 30 mg/kg). All other diets provided intermediate weight gain. Reproductive success was limited in those fed human diets, suggesting one or more nutrients were limiting in either quantity or quality. These data suggest that zebrafish can be used as a model for evaluating ingredients and nutrients associated with the human diet.
7. 10:10 am      URBAN TURTLE PROJECT: DOCUMENTING TURTLE POPULATIONS OF BIRMINGHAM URBAN WATERWAYS. *Andrew Coleman*, Hueytown High School. Alabama represents one of the world's greatest hotspots of



chelonian biodiversity, but little research has been done on Alabama's urban turtle populations. The present study aims to be a long-term conservation project that documents the demography, ecology, and survival of turtle species inhabiting the waterways of the Birmingham metropolitan area. Efforts began in 2017, and several sites in the Cahaba River and its tributaries as well as tributaries of the Black Warrior River were sampled. Nine of the possible ten species were captured, including the the protected Alabama Map Turtle (*Graptemys pulchra*) and Alligator Snapping Turtle (*Macrochelys temminckii*) species. Data gathered are already providing critical conservation and management information that will help ensure the continued survival of these populations.

8. 10:30 am      \*\*g EFFECTS OF CHEMICAL DISPERSANT (COREXIT 9500A) ON THE HISTOLOGY AND ION TRANSPORT FUNCTION OF BLUE CRAB (*CALLINECTES SAPIDUS*) GILLS. *Amanda Weiner*, Megan Roegner, and R. Douglas Watson, University of Alabama at Birmingham. Chemical dispersants are widely used in the remediation of spilled oil. When applied to an oil spill, such dispersants move to the oil/water interface and break the oil into small micelles, facilitating its dispersion through the water column. The several life cycle stages and broad distribution of blue crabs (*Callinectes sapidus*) increases the likelihood of their exposure to chemical dispersants used in remediation of spilled oil. Crustacean gills have multiple functions, including respiration and ion transport. Despite the economic and ecological significance of blue crabs in the western Atlantic and Gulf of Mexico, the effects of chemical dispersant on the structure and function of blue crab gills have not been adequately investigated. In studies reported here, adult blue crabs were exposed to the chemical dispersant Corexit 9500A (60-125ppm) under static conditions in glass aquaria containing artificial sea water. Effects of dispersant on gill structure were assessed using conventional histological methods. The results indicate exposure to Corexit 9500A resulted in an increase in gill epithelial edema. Effects of Corexit 9500A on gill ion transport function were assessed by quantifying the abundance in gills of transcripts encoding two Ca<sup>2+</sup> transport proteins, plasma membrane Ca<sup>2+</sup> ATPase (PMCA) and sarco/endoplasmic reticulum Ca<sup>2+</sup> ATPase (SERCA). Results of quantitative PCR showed PMCA and SERCA transcript abundance was significantly lower in gills of dispersant-exposed crabs than in gills of control crabs. The combined results are consistent with the hypothesis that exposure of blue crabs to Corexit 9500A negatively impacts the structure and ion transport function of gill tissue.  
Research supported by the BP/Gulf of Mexico Research Initiative.
9. 10:50 am      \*\*u EDIBLE OLEOGELS: BIOACCESSIBILITY OF RETINYL PALMITATE. *Isaiah Byrd*, University of West Alabama; *Nuria Acevedo*, Iowa State University. Oleogels have the potential to entrap and protect labile molecules while providing a suitable matrix for the delivery of lipid bioactive components. Previously, it was demonstrated that 10% Policosanol oleogels (PCOs) can entrap and protect retinyl palmitate (RP) from photodegradation. The goal of this study was to determine the ability of PCOs to gradually release RP during in-vitro digestion. PCOs were prepared at 10% w/w concentration containing 1% w/w RP. RP in liquid oil (RP-LO) was used as a control to account for the effects of structural difference on the release of RP. A three part (saliva, gastric, duodenal) in-vitro digestive system was developed to evaluate bioaccessibility of RP in the different matrices. Samples were collected at various times

(0, 30, 60, 120, 180 min) upon the duodenal stage to analyze the rate and amount of RP released. Normal phase high-performance liquid chromatography was used to quantify RP in the digested fractions. Compared to RP-LO, the RP-PCO had a slower and gradual RP release over three hours of digestion. The maximum release of RP from the liquid oil was observed after 30 minutes digestion whereas the maximum RP bioaccessibility in PCOs was upon 60min digestion. Our results demonstrated that PCOs are a suitable strategy to allow controlled and enhanced bioaccessibility of RP in food systems.

**11:10-11:20 am COFFEE BREAK/**

**BUSINESS MEETING (Elect Vice-Chair for 2019-2021)**

10. 11:20 pm      \*\*u ANNELID WORMS LIVING IN TOXIC HYDROGEN SULFIDE. *Shelby Lauzon*, Judson College, and David Johnson, Samford University. Very few species of Annelid worms live in Sulfur-rich environments. Little is known about the physiology of these few organisms that allows them to survive in toxic environments. An Annelid species belonging to the genus *Limnodrilus* was discovered in 2016 thriving in a highly toxic sulfur spring. The aim of our research was to identify the main mechanisms by which the *Limnodrilus* sp. detoxify themselves of hydrogen sulfide. Our data suggests that the *Limnodrilus* sp. exhibits two detoxification mechanisms via a sulfur dioxygenase enzyme and a sulfur-oxidizing bacterial symbiont. We used 16S rDNA primers from other sulfur-rich environment annelids to find these mechanisms. Current research involves the use of fluorescence *in situ* hybridization (FISH) to attempt to verify the presence of bacterial symbionts. Our study will help inform how these mechanisms play a major role in the longevity of this organism.
11. 11:40 pm      POLYPARASITISM IN THE BLOOD OF THE TUFTED TITMOUSE (*BAEOLOPHUS BICOLOR*) AND NORTHERN CARDINAL (*CARDINALIS CARDINALIS*). *Kayla Fast*, University of West Alabama. Blood parasites are ubiquitous in wild populations of birds and are genetically diverse. The parasites that cause avian malaria and similar diseases are transmitted to birds through the bite of specific insects (Order Diptera). In the wild, blood parasites can be maintained in bird populations as benign infections, while some cases are fatal. We report a high prevalence of polyparasitism (i.e., the presence of more than one parasite in a single host) in the Tufted Titmouse (*Baeolophus bicolor*) and Northern Cardinal (*Cardinalis cardinalis*). Total parasite prevalence was 86.0% in titmice and 74.0% in cardinals as determined using polymerase chain reaction (PCR). Parasite genera *Plasmodium*, *Parahaemoproteus*, *Leucocytozoon*, and *Trypanosoma* were found at significantly different levels in the two bird hosts in either singular or mixed infections. Cardinals were infected significantly more often with *Parahaemoproteus* single infections and *Parahaemoproteus/Plasmodium* mixed infections. Titmice, on the other hand, harbored more *Trypanosoma* single infections and *Trypanosoma/Plasmodium* mixed infections. Overlapping habitat between certain insect vectors and bird hosts is a possible explanation for why specific bird species are infected with specific parasites, but this theory requires further investigation. We also show evidence that infection with certain parasites is influenced by season, host sex, age, and health. Sanger sequencing and phylogenetic analysis of parasite cytochrome b and 18S rRNA genes revealed that titmice and cardinals are infected with some of the same genetic lineages of parasites including several novel lineages.

12. 12:20 pm      **\*\*u** FIRST EVIDENCE OF STRIPED BASS NATURAL REPRODUCTION IN THE TENNESSEE RIVER. *Karen M. Inouye*, Samford University; Anthony S. Overton, Samford University and Alabama A&M University; and Douglas A. Smith, Alabama A&M University. Striped bass, a very popular game fish, do not naturally occur in the Tennessee River system. Water flow conditions in reservoir systems generally cannot support striped bass recruitment. Striped bass were stocked in several reservoirs in Tennessee beginning in 1964 up until 1988 by ADCNR. Although ADCNR ceased striped bass stocking in 1988, age-1 fish striped have been collected and observed by Alabama Fisheries Biologist in Wilson, Wheeler, and Guntersville Reservoirs. This suggests that striped bass are successfully reproducing in the Tennessee River. The goal of this project is to determine if striped bass natural reproduction is occurring in Wheeler Reservoir. We conducted ichthyoplankton sampling during March-June (2016-2018) in Wheeler Reservoir and its tributaries (Flint and Paint Rock Rivers). Larval striped bass abundance was variable throughout the study. We collected 38 total striped bass larvae in 2016 and 2018. There were no larval striped bass during 2017. Approximately 90% of the striped bass larvae were collected during May. There were no clear spatial patterns in larval abundance. Our study provides clear evidence that striped bass are successfully spawning and recruiting in Wheeler Reservoir. Wheeler Reservoir joins Lake Powell (Utah), Lake Texoma (Texas-Oklahoma), and Santee-Cooper (South Carolina) as the only confirmed reservoirs in the United States where striped bass are successfully spawning and recruiting.

**\*\*u** or **\*\*g** Denotes presentation entered in student competition as an undergraduate or graduate student, respectively.

**SECTION I – BIOLOGICAL SCIENCES**  
**Poster Session**  
**Thursday Afternoon**  
**KCC Atrium and Ballroom Foyer**  
**Authors Set-up: Begins at 7:30 AM**  
**Authors Present: 1:30 PM – 3:30 PM**  
**Gordon MacGregor & Brad Bennett, Presiding**

14. \*\*u THE EFFECTS OF EXERCISE OF MEMORY: THE BRAIN-BODY CONNECTION. *Shelby Perez*, Faulkner University. This study should result in a higher memorization of the pictures after the exercises. I believe all the training methods will have a higher percentage of memorization than the non training group. Testing the memory will happen with a set of 40 pictures and then using different styles of exercise consisting of interval, resistance, and aerobic training to see which type of training methods will be most effective upon helping the memory to remember the set of pictures. Two tests will be administrated a baseline recall test to see where all of the participants stand with their initial memory recall. The second test will be done when the each group will finish the required twenty minutes of exercise time. The results will be analyzed and recorded.
15. \*\*u *In Vitro* INTERACTION OF TANNIC ACID AND SULFADIAZINE AGAINST *TOXOPLASMA GONDII*. *Joy Massey*, Daniel Abugri, and Aarin Hoffman, Tuskegee University. *Toxoplasma gondii* (*T. gondii*) is a zoonotic neglected parasite that continues to infect over 2 billion people globally, with over 60 million people infected in America. Currently, there are no effective vaccines nor drugs for the treatment of the chronic stage of *T. gondii* infection in humans and animals. The few medicines that inhibit the proliferation of the acute stage (tachyzoite) are very toxic and expensive. Thus, there is an urgent need to develop new inhibitors that will be safe, effective and affordable for the treatment of both human and animal toxoplasmosis. Here, we hypothesized that “tannic acid which is known to have antimicrobial and antioxidant properties when combined with sulfadiazine will potentiate its anti-*Toxoplasma gondii* activity”. From this study, we reported the *in vitro* activity of tannic acid alone and in combination with Sulfadiazine against *T. gondii* (RH-GFP) strain. We observed that at lower concentrations of tannic acid and sulfadiazine alone inhibited parasites growth ranged from 2% to 29%, and 4% to 35% respectively, whereas in the combination treatment, the inhibition of parasites growth was ranged from 16% to 19%. Further studies are ongoing to assess these findings and will be presented during the conference.
16. \*\*u ANTI-PROLIFERATION ACTIVITY OF HYDROQUININE COMBINATION WITH GENISTEIN AGAINST *TOXOPLASMA GONDII*. *Carlyn Logwood* and Daniel Abugri, Tuskegee University. Genistein is a natural isoflavone compound derived from soybean. This compound is known to have anticancer, antiparasitic, and chemo-protectant properties. Dihydroquinine (hydroquinine) is a pharmaceutical impurity that has been known to have antimalarial and antibacterial properties. Little is known about

- the dihydroquinine alone and its combination with genistein anti-Toxoplasma gondii (*T. gondii*) activity. Thus, this study will assess the anti-proliferation activity of genistein, hydroquinine, and their combination against *T. gondii* strains using human foreskin fibroblast as a medium of propagation. We will communicate the anti-proliferation activity of *T. gondii* parasites using 48 and 72 hours interaction during the conference.
17. \*\*g NUTRIENT IMPACTS ON LARVAL SETTLEMENT OF THE UPSIDE-DOWN JELLYFISH. *Lindsay MacMillan* and *Dustin Kemp*, University of Alabama at Birmingham. Nutrient loading in coastal waters is a threat to marine ecosystems. Using the upside-down jellyfish, *Cassiopea* spp., this study investigates how increased concentrations of nutrients affect larval settlement. The impact of four concentrations of  $\text{PO}_4^{3-}$ ,  $\text{NO}_3^-$  and  $\text{NH}_4^+$  on larval settlement of *C. xamachana* and *C. frondosa* was monitored for four days. Two cues known to successfully induce settlement in these species were used and compared with similar nutrient treatments without cues. Interestingly, high concentrations of nutrients did not cause larval death before settlement, and there was a difference in settlement response between the two species. *C. frondosa* larvae reached just 10-30% settlement with an added chemical cue, while settlement was negligible for all other treatments. *C. xamachana* larvae treated with the same chemical cue reached 70-80% settlement; and when treated with  $\text{NH}_4^+$  settlement was increased by 7-10% compared to the control groups without nutrient additions. Conversely,  $\text{PO}_4^{3-}$  treatments inhibited settlement up to 75% for *C. xamachana* larvae given the same chemical cue. We plan to expand upon these finding by adding the juvenile life stage (i.e.- ephyra) that contain algal symbionts (family: Symbiodiniaceae) to examine how these nutrients may affect the symbiotic partnership once strobilation has occurred.
  18. \*\*u DISCOVERY OF NOVEL BACTERIOPHAGE *OKaNui*. *Kaitlyn Mayfield*, *Kayla Fast*, *Tracy Keener*, and *Michael Sandel*, University of West Alabama. Bacteriophage (Phage) are a specific type of virus that infects a host bacteria for the purpose of replication and as a source of food. Bacteriophage destroy their host to release new phages when their need for them has subsided. Bacteriophage are an exceedingly significant component in the discovery of new treatments for bacterial diseases. As viruses and bacteria evolve, they are becoming immune to antibiotics which was my motive for discovering my bacteriophage. *OKaNui* was a phage discovered in Meridian, MS from a soil sample collected in August 2018. *Mycobacterium smegmatis* mc2155 was the host bacterium. Various techniques were applied including spot and full-plate titers, serial dilutions, polymerase chain reaction (PCR), and gel electrophoresis. DNA from *OKaNui* was extracted and concentrated. *OKaNui* has been added into the official SEAPHAGES bacteriophage database.
  19. \*\*u BIOTIC AND ABIOTIC FACTORS AFFECTING THE DISTRIBUTION OF CARRION BEETLES IN A LARGE URBAN PARK IN ALABAMA. *Erik Johansen*, *John Bryant*, *Neilly Ficken*, *Madeline Fric*, *Grant Gentry*, *Hannah Harper*, *Luke McKay*, *Bella McLay*, and *Madeleine Mitchell*, Samford University. Carrion beetles are decomposers that provide essential ecosystem services. Central Alabama is at the fringe of carrion beetle habitat, thus population distribution of these species is not well characterized in this region. We investigated whether habitat type, soil temperature, soil compaction, air temperature, and ant presence impact carrion beetle presence and

distribution using pitfall traps in Red Mountain Park, Jefferson County. We found that habitat type, soil temperature, and soil compaction did not have a significant impact on carrion beetle distribution. However, we determined that air temperature correlated with ant presence, and consequently ant presence had a significant impact on carrion beetle presence. We hypothesized that ants affected carrion beetle presence since these species compete for carrion.

20. \*\*u EFFECT OF TANNIN ON WEEVIL POPULATIONS ACROSS OAK SPECIES. *Merrilea Duke*, Johnny Herbert, Erin Prester, and Malia Fincher, Samford University. Tannins are secondary metabolites used by oak trees as a defense against enemies, such as weevils, due to their ability to bind proteins in the midgut epithelium of the weevil. Our experiment examined tannin content and weevil infestation rates in six oak species. We predicted that oak tree acorns with higher tannin content would have lower rates of weevil infestation and that oak species in the red oak group would have a lower rate of weevil infestation, because red oaks on average have a higher tannin concentration than white oak species. We collected representative samples from six species of oak and quantified the weevil infestation rate per individual tree. We used a colorimetric method to extract and quantify the tannin levels in acorns of each species. We found that on average red oak species do indeed have a higher tannin concentration than white oak species. However, examination of weevil infestation of acorns and tannin concentration among three species of white and three species of red oak revealed that only two species had significant relationships between tannin content and weevil infestation. These correlations showed conflicting trends, with tannin content negatively associated with weevil infestation in post oaks, as predicted, but positively associated with weevil infestation in southern red oak. These counterintuitive results may be the result of multiple species of weevil attacking oaks in the area, particularly if the degree of dietary specificity of the weevils varies. Specialist and generalist herbivores and seed predators often respond differently to plant defenses.
21. \*\*u THE EFFECTS OF STRESS ON *STREPTOMYCES* PIGMENTATION. *Zeenia Punjani*, Kristi Martin, Sarah Adkins, and Jeffery Morris, University of Alabama at Birmingham. *Streptomyces* are prolific soil bacteria, known for their production of secondary metabolites, including over 60% of all clinically utilized antibiotics. *Streptomyces* colonies often create pigmentation, visible on agar plates as a range of colors, which are related to their production of these volatile metabolites. Understanding when and why *Streptomyces* produce pigments is therefore important to researchers interested in their clinical and basic science applications. Based on unexpected observations from agar art created in a Course-based Undergraduate Research Experience, this study investigated the effect of stress on the loss of pigmentation of two *Streptomyces* strains isolated from soil, *Streptomyces chartreusis* and *Streptomyces lavendulae*. Both of the isolates were cultured under nutrient-rich growth conditions where both strains presented their original pigment (red and blue, respectively). Streak plates of each isolate were exposed to five different stresses in separate petri dishes: high cell density, low carbon media, cross-competition with other microbes, antibiotics, and ultraviolet light. Both *S. chartreusis* and *S. lavendulae* demonstrated evident discoloration in the presence of each of the five stress environments. These results indicate that some *Streptomyces*' pigmentation may only form in conditions that mimic their environment and decolor in the presence of stress. Ongoing research is elucidating

the generalizability of these findings by conducting the same methods on an array of *Streptomyces* strains.

22. \*\*u AN INVESTIGATION INTO EFFECTS OF ARTIFICIAL SUGAR IN MICE. *Alexandra Selico-Dunn*, Faulkner University. A seven-week rearing experiment was completed on mice in order to determine the relationship between use of artificial sugar and pure cane sugar in regards of overall health. Results were obtained from each experimental and control groups of mice. Each individual mouse was weighed at the end of each week and had their FBG (Fasting Blood Glucose) taken three separate times throughout the experiment. The mice received the sugar each morning which was based on their weights. During the trial, three mice developed mass-abscess like tumor on their bodies. The results from the experiment showed no significant effect of the sugar treatments on weight gains and FBG and that the pure can sugar mice were overall as healthy as the mice who received artificial sugar.
23. \*\*u *NiaP*, A PUTATIVE VITAMIN B3 TRANSPORTER, IN BACTERIA. *Shannon Gilstrap*, Katie Burrelle, Kloe Freeman, and Brad Bennett, Samford University. Vitamin B3 compounds, such as niacin and nicotinamide, can be converted into nicotinamide adenine dinucleotide (NAD), a cofactor that is crucial to many metabolic processes. Using a growth and rescue assay, we looked at the uptake of vitamin B3 in a *Anada* knockout mutant of *E. coli*, where a de novo NAD synthesis pathway would be blocked and a salvage pathway would have to be utilized in order for the cell to survive. Here, the salvage pathway would involve uptake niacin via a transporter. The *NiaP* family of transporters is not well studied but has been shown to transport vitamin B3 in two bacterial species so far and may have orthologues across the all Domains of life. These are likely members of the multifacilitator superfamily (MFS) and possess 12 moderately conserved transmembrane regions. Using bioinformatics and molecular biology, we have identified, PCR-amplified, and cloned *niap* genes from several bacterial species into plasmid vectors. Our goal is to expand this functional assay to determine whether *NiaP* in probiotic species such as *Lactobacillus casei* are definitively niacin transporters. This would help to quantify the beneficial properties of common probiotics found in foods and dietary supplements.
24. \*\*u EXPRESSION OF RECOMBINANT TAMM-HORSFALL PROTEIN IN KIDNEY CELLS FOR LARGE SCALE ISOLATION AND PURIFICATION. *Valentyna Trull*, Judson College; Kaice LaFavers and Tarek El-Achkar, Indiana University School of Medicine. Tamm-Horsfall Protein (THP) is the most abundant protein found in the urine, and is produced in the thick ascending limb (TAL) of the loop of Henle. THP is a glycoprotein that regulates ion transport in the TAL, protects against urinary tract infections and kidney stones and serves as a marker for kidney function. Mutations in the *UMOD* gene have been associated in patients with medullary cystic disease type 2, familial juvenile hyperuricemic nephropathy, and glomerulocystic kidney disease, demonstrating its importance for optimal kidney function. Polymerization of THP *in vivo* is regulated by its Zona Pellucida domain but our lab has isolated a truncated form of THP that does not polymerize. This form has shown promising use as therapeutic treatment to protect against kidney injury in a mouse model. The goal of my project is to develop a system to express this truncated form of THP recombinantly in tissue culture. To do this, we first determined the optimal conditions to transfect a plasmid expressing

recombinant THP into a kidney cell line and then used these conditions to begin establishing a stable cell line expressing THP. Ongoing work includes validating the stable cell line and optimizing conditions for large scale protein production and purification. These findings will be used to produce THP in cell culture, thereby alleviating the need to extract the protein from human urine. This recombinant THP will be used as a therapeutic agent in mouse studies with an end goal of translating these findings to humans with kidney injury.

25. \*\*u DISCOVERY, ISOLATION, AND CHARACTERIZATION OF MYCOBACTERIOPHAGE *Candle*. *Emma Ryan*, Kayla Fast, Tracy Keener, and Michael Sandel, University of West Alabama. The mycobacteriophage *Candle* was discovered in a soil sample found in Northport, Alabama at the base of garden okra plants. Using the host, *Mycobacterium smegmatis* mc<sup>2</sup>155, the sample was filtered, purified, and diluted until the bacteriophage was ready for DNA extraction. Techniques including polymerase chain reaction, gel electrophoresis, and grid staining were used in the final steps. Photos of the phage were taken before finally being archived
26. \*\*u THE ADVENTURES OF DISCOVERING A BACTERIOPHAGE: *SUMTER*. *Garren Granec*, Kayla Fast, Tracy Keener, and Michael Sandel, University of West Alabama. A bacteriophage is a virus that hijacks a bacteria in order to replicate. The discovery of the bacteriophage *Sumter* was a complex process. It began by taking a soil sample from the University of West Alabama Rodeo Complex. *Sumter* was then filtered and purified. Then the phage DNA was extracted and then the whole genome was sequenced. The phage was stained with uranyl acetate, and images were captured using a transmission electron microscope.
27. \*\*u DISCOVERY AND PURIFICATION OF THE BACTERIOPHAGE *Chip*. *Anna Morse*, Tracy Keener, Kayla Fast, and Michael Sandel, University of West Alabama. Bacteriophages are a type of virus that infect bacteria. The bacteriophage, *Chip*, was discovered on West Main Street, Livingston, Alabama on 9/4/18. *Chip* was collected by digging into the damp soil with a plastic spoon and putting the soil in a plastic bag. A series of methods was used to purify *Chip*, which included: filtration, enriched isolation, plaque assays, serial dilutions, and webbed plates. From the lysate, DNA was extracted and the phage was imaged by transmission electron microscopy.
28. \*\*u ENVIRONMENTAL ANALYSIS OF FREETOWN CREEK IN PERRY COUNTY. *Quenteeria Mooney* and Kristopher McConnell, Judson College. In order to protect the environment and prevent the spread of communicable disease, municipal sewage must be treated before it is released into the environment. Inadequate treatment of sewage prior to release can result in nutrient pollution and elevated levels of fecal coliform bacteria. We tested pollutant levels in Freetown Creek south of Uniontown, a small community in southern Perry County, Alabama. Freetown Creek lies in close proximity to the Uniontown sewage lagoon. We detected elevated levels of fecal coliforms on multiple occasions, as well as consistently elevated levels of dissolved phosphates. However, these levels were also observed in Freetown Creek upstream of the lagoon, suggesting that they may be due to agricultural runoff.
29. \*\*g BRINGING BACK LONGLEAF PINE: ARE THREATENED AVIAN SPECIES RESPONDING? *Natalie Harris*, Robert Gitzen, and William Gulsby, Auburn



University. The historical distribution of longleaf pine (*Pinus palustris*) included approximately 36 million ha of the southeastern United States; now it only exists within 3% of its original range. Unfortunately, >30 threatened or endangered species rely on the savanna ecosystems of which this species is an integral part. The U.S Fish and Wildlife Service, through their Partners for Fish and Wildlife program, has been planting longleaf pine on private land for the last 16 years in an attempt to restore longleaf ecosystems and benefit wildlife that rely on them. However, the program's efficacy at supporting focal avian species such as the Bachman's Sparrow (*Peucaea aestivalis*) has not been evaluated. In 2018 we surveyed 42 private properties throughout south Mississippi to assess the presence/absence and occupancy probability for this species during the breeding season. We detected 3 individuals at 1 property during our first field season. Although our results are preliminary, it appears that the effectiveness of longleaf restoration efforts are limited by post-planting management. Specifically, the absence of frequent, low-intensity prescribed fire on many of the sites we sampled may be leading to poor habitat conditions within restored longleaf stands. These findings may be used to inform future longleaf restoration program requirements.

30. \*\*u ISOLATION AND CHARACTERIZATION OF CORYNEBACTERIUM XEROSIS LYSOGENS. *Sristi Das* and Denise Monti, University of Alabama at Birmingham. Phages are the most abundant entities on earth and are believed to play a key role in nutrient cycling in the environment. Lytic phage infection is marked by production of new viral particles and bursting of the host cell to release progeny virus. Temperate phages take advantage of a phage integration system to stably integrate the phage genome into the genome of the bacteria host (lysogeny). In 2017, students in the UAB Phage Genomics program isolated and characterized 5 novel phages infecting the host *Corynebacterium xerosis*. These were among the first known phages isolated for this particular host and all appeared to have characteristics of temperate viruses. Full genome sequencing of 4 of the 5 phages proved all genomes contained a tyrosine integrase gene. In this project, we sought to determine whether stable lysogens could be isolated for each of the 5 newly characterized viruses. We then tested cross-infection of the lysogens using a new panel of *C. xerosis* phages isolated in fall 2018. We were able to isolate lysogens for all 5 *C. xerosis* phages and noted distinct infection patterns in the lysogen infection experiments. The results of these experiments were used to inform selection of additional *C. xerosis* phages for full genome sequencing in 2018. Taken together, these results show that *C. xerosis* phages share similar integration enzymes with other phages infecting hosts of the Order Actinomycetales despite host specificity. Moreover, lysogen cross-infection experiments can be informative for the selection of unique genomes prior to full genome sequencing.
31. \*\*g CHEMICAL RESPONSE OF LOBLOLLY PINE (*PINUS TAEDA* L) TO *LEPTOGRAPHIUM TEREBRANTIS*. *John Mensah*, Auburn University; Mary A. Sword Sayer, USDA Forest Service; Ryan L. Nadel, Auburn University; George Matusick, New York City Department of Environmental Protection; and Zhaofei Fan and Lori G. Eckhardt, Auburn University. Loblolly pine (*Pinus taeda* L) is well known for its structured physical and chemical defensive mechanisms against invasion by pest and pathogens. Within the chemical defense system, a number of secondary metabolites such as terpenes, phenolics, and alkaloids, have been shown to possess antimicrobial properties. However, the quantity and quality of these metabolites differ based on a

particular pathosystem. The goal of the study is to assess the changes in total resins and phenolic content of loblolly pine undergoing growth stress from the root pathogen *Leptographium terebrantis*. Quantitatively, the induced resins in the *L. terebrantis* inoculated trees were significantly higher relative to the constitutive resins but the total soluble phenolics did not differ. There was no mortality in the low, medium, and sterile inoculated trees but mortality from the high inoculum trees was 13%. The cause of mortality is attributed to the copious amount of resins produced which occluded the sapwood triggering hydraulic dysfunction.

32. THE EFFECT OF NITROTYROSINE ON SKELETAL MUSCLE GROWTH AND DIFFERENTIATION. *Matty Crowder* and *Mary Anne Garner*, Judson College. Tyrosine nitration is a hallmark of many neurodegenerative diseases. While the biochemical mechanism for the production of nitrated tyrosine residues in proteins in these disease states has been elucidated, it is unknown how these changes affect cellular metabolism. Here, we investigate the effects of free nitrotyrosine, a modified amino acid, on skeletal muscle cell growth, differentiation, and viability. Skeletal muscle was chosen as a model system since there is evidence for tyrosine nitration in the muscle fibers of patients and animal models of amyotrophic lateral sclerosis (ALS), also known as Lou Gehrig's disease. Though the focus of ALS tends to be the degeneration and death of motor neurons, it is of interest to discover the effects nitrated tyrosine residues might have on skeletal muscle health and consequently motor neuron viability. The nature of motor neuron degeneration in ALS is not completely understood, and the interaction of motor neurons with affected skeletal muscle may affect the overall health and viability of both tissues.
33. \*\*u CHARACTERIZATION OF 513 NOVEL, PUTATIVE SMALL RNAS (SRNAS) IN CARBON-STARVED *SALMONELLA ENTERICA SEROVAR TYPHIMURIUM*. *Donavon Dahmer*, University of South Alabama. Small RNAs (also known as sRNAs) are short (estimated 50-200 nucleotides long) noncoding RNAs that control cellular functions in prokaryotes. In *Salmonella enterica* starved of a carbon-energy source, hundreds of (previously uncharacterized) sRNAs have been identified as bacterial regulators of microbial defenses against stressors (e.g. sterilization techniques and antibiotics). Specifically, sRNAs are now known to specialize in altering the levels of protein coding genes in correspondence to their external surroundings (stressors) to ensure a high survival rate. Of note, less than 10 *Salmonella* sRNAs had been identified just five years ago. That said, within the past two years, the Borchert lab published a work identifying 58 entirely novel sRNAs involved in regulating the *Salmonella* carbon starvation response. Excitingly, through coupling the methodologies presented in that original study with several novel strategies, we have now successfully identified and validated 513 entirely new *Salmonella* sRNAs as presented here. Strikingly, in addition to their practical implications, our results suggest sRNA genes actually outnumber protein coding genes in *Salmonella* as well as in many other bacterial species. Perhaps most importantly, however, we found evidence suggesting several of the sRNAs identified in this work will likely prove functionally relevant to *Salmonella* stress adaptation and the acquisition of antibiotic resistances and therefore represent novel therapeutic targets.
34. \*\*u SEX RATIO PRODUCED IN KEMP'S RIDLEY RECOVERY PROGRAM AT THE PADRE ISLAND NATIONAL SEASHORE DURING THE 2017 NESTING

SEASON. *Elizabeth Bradley* and Thane Wibbels, University of Alabama at Birmingham. Due to extensive conservation efforts by American and Mexican agencies, the fate of the world's most endangered sea turtle, *Lepidochelys kempii*, the Kemp's Ridley sea turtle, has grown more optimistic with every nesting season. However, the increasing impacts of global climate change has the potential to undermine this success. Kemp's Ridley sea turtles have temperature-dependent sex determination in which higher incubation temperatures result in female hatchlings and cooler incubation temperatures result in male hatchlings. This study, which is a part of the Kemp's Ridley Recovery Program, evaluates the sex ratios from sea turtle nests on Padre Island National Seashore using histological examination of dead hatchlings collected from nests during the 2017 nesting season. The current data indicates a significant female bias. This may be beneficial for the population, as increased numbers of females could potentially improve the rate of recovery for this population in future seasons. This data will be utilized by the National Park Service, and the many partners of the Kemp's Ridley Recovery Program, to optimize their Kemp's Ridley Recovery Program.

**\*\*u** or **\*\*g** Denotes presentation entered in student competition as an undergraduate or graduate student, respectively.

## ABSTRACTS

### SECTION II. CHEMISTRY

**Paper Session**  
**Thursday Morning, 10:00 AM**  
**KCC Room D**  
**Christopher Stopera, Presiding**

1. 10:00 AM \*\*u RECOVERY OF PRECIOUS METALS USING ORGANIC REDUCTION AGENTS. *Kayla Herren*, Chris Loveless, Jan Gryko, Jacksonville State University. Significant quantities of liquid waste containing precious metals is made by various industries. For example, silver waste is produced by photographic processes, and gold containing waste is generated by some analytical labs. We have used vitamin C and glycerol to recover these metals. We were able to recover practically 100% of silver from the photographic waste using vitamin C as the reduction agent. Similarly, using vitamin C, we recovered 100% of gold and palladium from an acidic waste. In both cases, silver and gold were recovered from raw waste at room temperature and without waste preprocessing. Platinum can also be recovered with approx. 99% recovery rate, but the process must be carried out at an elevated temperature.

\*\*u or \*\*g Denotes presentation entered in student competition as an undergraduate or graduate student, respectively.

**SECTION II. CHEMISTRY**  
**Poster Session**  
**Thursday Morning**  
**KCC Atrium and Ballroom Hallway**  
**Authors Set-up: Begins at 7:30 AM**  
**Authors Present: Poster Session (10:30 AM – Noon); Viewing and Judging**  
**Christopher Stopera, Presiding**

2. \*\*u RECOVERY OF SILVER FROM SILVER WASTE. *Zora Rich*, Jade Stanley, Marilyn Tourne, Tuskegee University. The overall goal of the TIP research group is to improve the laboratory curriculum and the environment through Guided Inquiry experiments in undergraduate courses at Tuskegee University. Specifically, to develop a sequence of labs which create a “closed loop” for silver – the Ag Loop. This research focuses on the first phase of the Ag Loop – purification of silver waste and conversion to silver metal via an environmentally-friendly process. The recovery of silver takes place in various steps including centrifuging waste with deionized water, molar acidification with

a strong acid, agitation of waste using thiourea, filtration through a Büchner funnel and glass fiber filter, then finally drying in an oven at 100°C. These green processes are meant to convert silver ion waste (Ag<sup>+</sup>) to silver sulfide (Ag<sub>2</sub>S). Once silver sulfide (Ag<sub>2</sub>S) is obtained, the product is calcinated at 400°C for 6 hours to retrieve metallic silver (Ag<sup>0</sup>). Silver sulfide produced was calcinated then tested using Energy Dispersive Spectroscopy (EDS) as well as Fourier-Transform Infrared Spectroscopy (FTIR). FTIR data showed that the sample contained 80% silver. Through EDS analysis, it was shown that the sample consisted of 61% silver, 6% sulfur, and 32% oxygen.

3. **\*\*g SYNTHESIS AND CHARACTERIZATION OF AMINO ACID MODIFIED CARBON NANODOTS.** *Garfield Grimmatt*, Willard E. Collier, Taylor Williams, Brianna Tibbs, Tiyon Carter, Tuskegee University. Carbon nanodots (C-dots) are nanomaterials synthesized from carbon rich compounds that have strong fluorescence and tunable photoluminescence. 1 Carbon nanodots are easily produced, less toxic, inexpensive, bio-compatible, and more water soluble than semiconductor quantum dots. 1 C-dots strong fluorescence and bio-compatibility, allows the potential of being used in bioimaging, nanomedicine, photovoltaic devices, sensors, and nanoprobe applications. 2 C-dots unique photoluminescent properties are a result of their nitrogen and oxygen content. Amino acids are oxygen or nitrogen-rich compounds that can not only improve C-dots photoluminescence but also increase their surface functional groups, prevent particle aggregation and improve cross linking<sup>3</sup>. This study investigates the effects of amino acid modification on C-dot morphology, photoluminescence, and antimicrobial properties. C-dots were synthesized by the hydrothermal method with precursors arginine and methionine mixed with sucrose. The C-dot solutions were light brown and fluoresced light green. SEM, TEM, and XRD will be used to characterize morphology and crystal lattice structure. The paper disk diffusion method will be used to test the C-dots antimicrobial properties.
4. **\*\*u FORMULATION OF AN *ALOE VERA* GEL-BASED SKIN CARE PRODUCT USING ALL-NATURAL INGREDIENTS.** *Marissa Jones*, Willard E. Collier, Tuskegee University. *Aloe barbadensis* miller, also known as *aloe vera*, is a drought-resisting, perennial plant that has been used medicinally for centuries. The fleshy inner layer of the *aloe vera* leaf contains 90% of *aloe vera*'s beneficial ingredients. This layer is a transparent, gel-like portion that is mainly water along with essential amino acids, mineral, lipids, vitamins, and other compounds. Because of *aloe vera*'s beneficial effects on skin, *aloe vera* is commercially cultivated in the United States, Mexico, China, Japan, and other countries with a current annual market value of \$70-90 million. The global skin care market has surpassed \$180 billion annually and is growing rapidly. As a result, the increased demand for natural *aloe vera* products has led to *aloe vera* being proposed as a new specialty crop for small farmers. The purpose of this initial research was to grow *aloe vera* plants locally and produce an effective, consumer acceptable *aloe vera* skin gel with natural ingredients. These natural ingredients include sodium benzoate (preservative), ascorbic acid (skin nutrient), vegetable glycerin (skin nutrient), and

tartaric acid (pH adjuster). A series of formulations were made by varying ratios of ingredients, number of ingredients, and water-based vs. non-water-based product. The use of water resulted in non-consumer acceptable gels. Other physical properties are discussed in the results section. In further studies, the all-natural gel will be compared to commercial *aloe vera* skin care products using NMR spectroscopy to detect adulteration.

5. \*\*u THE USE OF *ALOE VERA* LEAF EXTRACT FOR THE SYNTHESIS OF SILVER NANOPARTICLES. *Nathalie Momplaisir*, Mohamed O. Abdalla, Mohamed A. Abdalla, Tuskegee University. Metal nanoparticles, specifically silver nanoparticles, have been used extensively in a variety of sectors due to their size, shapes, and additional physical and chemical properties. Biosynthesized metal nanoparticles based on green chemistry come with numerous advantages that encompass the reduction of hazards to the environment. This study is aimed to synthesize eco-friendly silver nanoparticles using crude extract from *Aloe vera* leaves and silver nitrate. It was hypothesized that the green synthesis of nanoparticles would result in innocuous and biocompatible nanoparticles that can be used in various areas of research and treatment. The *Aloe vera* extract was added drop wise to the silver nitrate solution. The appearance of a reddish-brown color was an indicator to the reduction of silver ions to form silver nanoparticles. The synthesized nanoparticles were dried at 400°C. The percent yield of the synthesized silver nanoparticles was extremely low. New approaches are underway to optimize the conditions of the synthesis.
  
6. \*\*u CONSTRUCTING A THREE COMPONENT MANNICH REACTION USING A SILVER TETRANITRILE COMPLEX. *Quentoria Walton*, Morgan Fair, and Mohamed A. Abdalla, Tuskegee University. The need for novel, environmentally friendly catalysts has prompted scientist to engage in research to discover various homogeneous catalysis. This study utilizes a recyclable silver catalyst that is recovered from general chemistry waste reactions and can be used again in further works. The catalyst is used in a one-pot Mannich reaction using an amine, a ketone, and an aldehyde to synthesized the desired product. The objective of this study was to utilize an efficient, environmentally friendly catalyst in the three components Mannich reaction and recover this catalyst from the reaction for future reuse. A teranitrile ligand, propylenediaminetetrapropionitrile, was synthesized from 1,3 diaminopropane and acrylonitrile. The ligand was combined with AgNO<sub>3</sub> to form the silver complex to prepare the catalyst. The Mannich reaction was prepared in methanol with the addition of aniline, benzaldehyde, and acetophenone as reagents with the catalyst and the reaction progress was monitored by thin-layer chromatography. The product was successfully obtained and characterized by ATR-FT-IR and NMR. The FT-IR analysis showed an amine peak (3367.19), the C-H carbonyl peak at (3059.97), the C=O carbonyl peak at (1079.73), and the C=C bond at (1358.05-1576.55) which is indicative of the spectra expected of the characterized product. From the NMR spectra, peaks around 6.6 -8 showed the protons on aromatic rings; peaks at 3.27, 3.7 and 5.0 showed the remaining hydrogens in the product. Based on the ATR-

FTIR and NMR results, the Mannich reaction was successful in achieving the desired product.

7. **\*\*u SYNTHESIS AND CHARACTERIZATION OF THE ZINC AND MANGANESE COMPLEXES OF 5,10,15,20-TETRA[3,4-DIBENZYLOXYPHENYL]PORPHYRIN.** *Erin Hutchens*, Andrew Ezell, Hayes Palacio, and Prakash Bharara, University of Montevallo; Qiaoli Liang, University of Alabama; and Cynthia Tidwell and Trever Tidwell, University of Montevallo. Metalloporphyrins have been widely studied due to their applications in photochemical and biomedical fields. Metalloporphyrins are useful for an array of applications, such as in solar cells and as bactericidal agents. The objective of this research is the synthesis and characterization of zinc and manganese complexes of 5,10,15,20-tetra[3,4-dibenzoyloxyphenyl]porphyrin. Both complexes were synthesized using conventional methods and were purified using silica gel column chromatography with chloroform as the eluent. Upon the metallation of the porphyrins, the electronic absorption spectra exhibited a shift in the Soret band and disappearance of some of the Q bands as was expected upon metallation. The zinc complex exhibited a Soret band at 426 nm and Q bands at 552 and 594 nm with corresponding molar absorptivities of  $3.1 \times 10^5 \text{ cm}^{-1}\text{M}^{-1}$ ,  $1.5 \times 10^4 \text{ cm}^{-1}\text{M}^{-1}$  and  $5.5 \times 10^3 \text{ cm}^{-1}\text{M}^{-1}$ . The zinc complex gave an emission at 606 nm upon excitation in the Soret band and the quantum yield was determined to be 0.08 upon excitation at 515 nm. The manganese complex exhibited a Soret band at 482 nm and Q bands at 587 nm and 625 nm with corresponding molar absorptivities of  $9.6 \times 10^4 \text{ cm}^{-1}\text{M}^{-1}$ ,  $9.5 \times 10^3 \text{ cm}^{-1}\text{M}^{-1}$  and  $1.3 \times 10^4 \text{ cm}^{-1}\text{M}^{-1}$ . The manganese complex did not fluoresce upon excitation at the Soret or Q bands. Additional characterizations of these compounds are currently underway.
8. **\*\*u AMINO ACID INTERACTIONS IN THE L-DOPA-AROMATIC L-AMINO ACID DECARBOXYLASE ENZYME COMPLEX.** *Georgia Chamblee* and Donna Perygin, Jacksonville State University. We created a model in the MOE (Molecular Operating Environment) software package of the dimeric enzyme Aromatic L-amino Acid Decarboxylase (PDB 3RBL) and docked L-dopa into the putative active site. Interactions between this enzyme and its native ligand were studied to determine potential interactions for enzymatic activity. Strong (less than 5 angstroms) interactions with the A chain included D310, K361, R356 and D92.

*\*u* or *\*\*g* Denotes presentation entered in student competition as an undergraduate or graduate student, respectively.

## ABSTRACTS SECTIONS III & IV

### SECTION III – PHYSICS AND MATHEMATICS

Joint with

### SECTION IV. ENGINEERING AND COMPUTER SCIENCE

Paper Session

Thursday Morning, 9:00 – 11:30 AM

KCC Room B

Mel Blake, Presiding

1. 9:00 AM \*\*u MEASURING VISCOSITY WITH A DAMPED HARMONIC OSCILLATOR. *Donavan Ebersole*, Ty Naquin and James Sanders, Troy University. A mass-on-spring harmonic oscillator can be damped via Stokes' Law drag when placed in a viscous fluid. The viscosity of the fluid and hence the damping constant for the oscillator is temperature-dependent, so by changing the fluid temperature we can control the amount of drag present. We attached a spherical mass to a spring that was suspended in the liquid. After slightly displacing the mass, we record the Hooke's Law force during the motion. A graph of force versus time yields the damping coefficient and hence the coefficient of viscosity. This experiment yields the viscosity of glycerol at room temperature to within approximately 15% of the known value. The viscosity of glycerol at different temperatures remains to be shown; this is the current focus of our research.
2. 9:20 AM \*\*u THE EFFECTS OF IMPACT VELOCITY ON IMPARTED IMPULSE. *H C Regan Bhatta*, Pawan Khanal, and James Sanders, Troy University. In this experiment, we have studied the relationship between the impulse imparted to an object its impact speed. The object is dropped onto a force-sensing platform, which records force as a function of time. An integration of this curve yields the imparted impulse. The time of contact with the platform is dependent both on the impact speed and the material properties. The relation between time of contact and impact velocity is, however, not linear.
3. 9:40 AM \*\*u SOUND INTENSITY MEASUREMENTS TO METER SCALES. *Sebastian Lee*, Victoria Colvin and James Sanders, Troy University. The intensity of a sound wave falls off like the inverse square of the distance from the source provided that the medium through which it propagates is isotropic, lossless, and reflectionless. However, if the waves are reflected from nearby surfaces, then the returning sound waves can create interference maxima and minima. For a source-detector pair operated in a typical lab room, the data obeys the inverse square law to ~10-15 cm, but at greater distances interference becomes significant. In this experiment, the sound intensity level is measured as a function of distance from the speaker. The predicted intensity maximum and minima locations have been calculated via simulation, and our experimental results agree with these calculations to distances of up to 0.5 m. This represents a ~tenfold increase in the detector-source distance which was previously reported[1].



[1] A. Bates, "Decibels via Loudness—Distance Properties of a Loudspeaker." *The Physics Teacher*, vol. 52, 302-303 (2014).

4. 10:00 AM \*\*g ANALYTICAL SOLUTION OF THE NONLINEAR KLEIN GORDON EQUATION USING PERTURBATION METHOD. *Samuel Uba* and Matthew Edwards, Alabama A&M University. In this research, we propose the use of the perturbation method to solve the nonlinear Klein Gordon equation. The perturbation method is a useful mathematical tool for finding approximate analytic solutions to problems whose analytic solution cannot be found. The multi-scales method a type of the perturbation approximation is utilized to solve problems such as the nonlinear Klein Gordon equation whose analytical solution yields secular terms in the asymptotic expansion solution leading to a breakdown. We have analyzed the perturbation effect on the solution of the wave equation as it relates to condensed matter physics and compared the validity of our solution to other analytic methods
5. 10:20 AM \*\*u MAPPING SOUND WAVES IN GNU OCTAVE. *Caroline Howell* and James Sanders, Troy University. The intensity of a sound wave emitted from a point source in an isotropic and reflectionless region of space will decrease by the square of the distance from the source. However, if boundaries are introduced, then the reflected waves can interfere with each other and with the incident wave. Therefore, sound waves emitted from a source in an enclosed room will have an intensity which follows the inverse square law for short propagation distances, but deviates as incident and reflected waves of comparable amplitudes interfere with each other. This project makes use of the MATLAB clone GNU OCTAVE to calculate the intensity of a sound wave as a function of distance from a source which is placed in an enclosed room. This calculation considers multiple possible paths along which a wavelet can propagate along to reach the detector: a direct path, 6 paths containing one reflection each, and 30 paths containing two reflections each. It then determines the relative amplitude and phase for each of these paths in order to create a superposition of these 37 wavelets at the position of the detector. Squaring this superposition wave's amplitude yields the sound intensity at the location of the detector.
- 10:40 AM \*\*g CHARACTERIZATION OF ELECTRON TRAPPING AT DIELECTRIC/4H-SiC. *Isanka Udayani Jayawardhena* and Sarit Dhar, Auburn University. Silicon Carbide is a wide bandgap semiconductor that is desirable for metal oxide semiconductor field effect transistor (MOSFET) technology, especially in high voltage power electronics applications. However, a significant drawback in SiC MOSFETs is the high channel resistance due to trapping of carrier electrons in traps at or near the SiO<sub>2</sub>/4H-SiC interface. Such traps are states within the bandgap with an exponentially increasing density near the conduction band-edge of 4H-SiC. For oxide films formed by thermal oxidation of 4H-SiC to SiO<sub>2</sub> without any special treatment, the interface state densities ( $D_{it}$ ) are much higher ( $> 10^{12} \text{ cm}^{-2}$ ) compared to traditional SiO<sub>2</sub>/Si. Methods such as post-oxidation annealing, changing the dielectric to high-k materials and employing different 4H-SiC crystal orientation are few approaches that can lead to reduction of  $D_{it}$ . Constant capacitance deep level transient spectroscopy (CCDLTS) is a powerful tool that measures the thermal emission rates of trapped electrons to measure  $D_{it}$  and differentiate between different types of traps present based on measured emission activation energies and capture cross-sections. These measurements can be correlated to atomistic calculations of defect energy levels to identify physical identities of the traps/defects. In this talk, we will describe the details of the CCDLTS method and present results we obtained for SiO<sub>2</sub>/4H-SiC MOS

capacitors fabricated in-house with different 4H-SiC crystal orientations and different dielectrics (SiO<sub>2</sub> and Al<sub>2</sub>O<sub>3</sub>).

11:20 AM BUSINESS MEETING: Elect a Section III. Vice-Chair for the 2019-2021 term

**SECTION III – PHYSICS AND MATHEMATICS**

**Joint with**

**SECTION IV. ENGINEERING AND COMPUTER SCIENCE**

**Poster Session**

**Thursday Morning**

***KCC Atrium and Ballroom Foyer***

**Authors Set-up: Begins at 7:30 AM**

**Authors Present: 11:30 AM –1:00 PM**

**Mel Blake, Presiding**

6. **\*\*u** A NEW EQUATION TO PREDICT THE PHONON THERMAL CONDUCTIVITY OF PURE INTRINSIC SEMICONDUCTORS. *Clay Thompson, Ayinde Chad, and Prakash Sharma, Tuskegee University.* A Theoretical model is revisited under the frame work of Boltzmann Approximations. A new equation has been developed. The current model has been applied to predict the thermal conductivity of semiconductors. The phonon scatterings by the crystal boundary, the point defects and the phonons have been included. It has been shown that the model is successful in explain the temperature dependence of phonon conductivity of silicon.
7. **\*\*u** LUMINESCENCE OF RARE EARTH DOPED GLASS. *Malcolm Johnson, Prakash Sharma and Akshaya Kumar, Tuskegee University.* Glasses are amorphous material and they are easy to prepare than growing crystals. When rare earth ions are doped in glass their optical properties are influence by the glass lattice structure. It is possible to tailor the optical properties of rare earth ions by changing the composition of glass. Rare earth ions doped glasses have wide range of optical applications such as they are used as laser materials and optical amplifiers. Using method of melting and quenching rare earth doped glass was prepared. The laser induced fluorescence measurement would be presented.
8. CUMULATIVE DISTRIBUTION AND CLUSTER ANALYSIS OF CONTINENTS AND ISLANDS. *Arjun Tan, Alabama A&M University.* Cumulative distribution and cluster analysis are two statistical tools used to analyze certain phenomenological studies. In this study, both are employed to analyze the statistical distributions of the sizes of the continents and islands using the square root of the area as the random parameter. The 6 continents and 51 largest islands were considered. The cumulative distribution places them on 3 distinct straight lines: one containing the continents and Greenland; the second containing the 5 largest islands after Greenland; and the third containing the smaller islands. A cumulative distribution in the logarithmic scale places them on 4 distinct straight lines: one grouping the continents; the second combining Australasia and Greenland; the third comprising the larger islands; and a fourth containing the smaller islands. Finally, a cluster analysis groups them in at least 5 distinct clusters of the continents, the large islands and at least 3 more clusters of smaller islands.

9. GROUPS, CLUSTERS AND CLUSTER ANALYSIS OF THE GREATEST BARBADIAN CRICKETERS. *Arjun Tan*, Alabama A&M University. In a span of 34 years were born 12 of the world's greatest cricketers in the tiny island of Barbados, 8 of whom were knighted and an equal number inducted into Cricket's Hall of Fame. They were born in 5 distinct groups within 2-year intervals who occupied different positions in the batting order. There were 3 opening batsmen, 5 middle-order batsmen including two all-rounders and a wicket-keeper batsman, and 4 fast bowlers, who were unanimously selected to the all-time Barbados cricket team. A cluster analysis was performed on the 12 cricketers which showed that they formed 6 distinct clusters of opening batsmen, middle-order batsmen including a wicket-keeper-batsman, all-rounders, and fast bowlers. Only one opening batsman had to be dropped to select the all-time Barbados cricket team. The captain and vice-captain were also selected.
10. MAGNETIC FLUX EMERGENCE, INTERCHANGE RECONNECTION, FLUX CANCELLATION, AND BLOW-OUT ERUPTIONS IN A SMALL CORONAL HOLE. M. L. Adams, NASA/Marshall Space Flight Center ; R.L. Moore, NASA/Marshall Space Flight Center and University of Alabama in Huntsville; and N.K. Panesar, NASA/Marshall Space Flight Center, Huntsville, AL. In this work, we report on the structure, evolution, and explosive behavior of an emerging-flux region of March 3-4, 2016. Flux emergence in a small coronal hole resulted in H-alpha brightening, subsequent eruptions, and the later development of a small sunspot. The initial emergence of a bipole, as seen in data from Solar Dynamics Observatory's (SDO) Helioseismic Magnetic Imager (HMI), was followed by the appearance of an anemone-type region, observed with SDO's Atmospheric Imaging Assembly (AIA) in multiple wavelengths (e.g., 193 Å, 211 Å, 304 Å, and 94 Å). We find that interchange reconnection of initially-closed emerging field with ambient open field affected the coronal hole, shifting the open field from one side of the emerging bipole to the other. A blow-out jet in this region is made by the eruption of a minifilament that forms over and erupts from a polarity inversion line between merging and cancelling opposite-polarity magnetic flux on the outside of the emerging bipole. There are three other blow-out eruptions from inside the emerging bipole; the largest of these makes a coronal mass ejection. Blow-out eruptions from inside emerging bipoles are rare. This emerging bipole had repeated blow-out eruptions from inside, probably because the emerging magnetic field was extremely twisted, which is evident from the sigmoid coronal form of the magnetic field. *Dr. Panesar's work was supported by the NASA Postdoctoral Program (NPP).*
11. **\*\*u** MULTISPECTRAL ILLUMINATION SYSTEM BASED ON THE INDUCED WAVELENGTH SHIFT IN AN ARRAY OF FIBER BRAGG GRATINGS (FBG). *Jennifer Olszyna*, Dylan McKelvey, and Ravi Gollipalli, University of North Alabama. (SECTION IV. ENGINEERING AND COMPUTER SCIENCE) A multi/hyperspectral illumination system is based on the basic principle that there are many sources that can emit at different wavelengths over a very sharp wavelength band. However, it is not possible to obtain sources that can produce wavelengths in the ~10 nm FWHM range over a wide spectrum of UV to IR. In this study, we want to use the induced wavelength shift of FBG due to strain as the source of wavelength. By systematically arranging the FBGs to reflect wavelengths over a wide range, we aim to develop a multi/hyperspectral illumination system with very narrow bands of wavelengths as needed.

12. **\*\*u DEVELOPMENT OF A NOVEL SPATIAL ATOMIC LAYER DEPOSITION SYSTEM FOR FAST FILM DEPOSITION.** *Tingyi Wei* and Dongqing Pan, University of North Alabama. (SECTION IV. ENGINEERING AND COMPUTER SCIENCE)
- Atomic Layer Deposition or (ALD), is a technique used for creating thin film layers for micro components that we use in everyday electronic devices such as smartphones, computers, and gaming systems. ALD uses surface chemical reactions, and chemicals such as trimethylaluminium [ $\text{Al}_2(\text{CH}_3)_6$  or TMA] with water ( $\text{H}_2\text{O}$ ), to create single thin layers on a substrate in nanometer scale. This is accomplished by depositing the chemicals in a sequence to cause the chemicals to react one after another. It has been used in multiple applications to create transistors, processors, memory drives, as well as solar panels. ALD is a proven effective nano-manufacturing technique to deposit nano-scale thin films with remarkable uniformity and conformity in surface geometry. ALD is an effective technique with precise results, but it does have a critical flaw, namely low throughput, which relates to longer manufacturing time. For instance, a conventional single wafer ALD system can only achieve a few nanometers of layer thickness per minute of deposition. This is due to the sequence time when the reactive chemicals must be deposited and purged one at a time so as not to cause a volatile chemical reaction. This abstract is aimed at designing and developing a spatial ALD system, which adopts the spatial concept to deposit materials much faster than the traditional time-based ALD by eliminating the significant amount of waiting time.

## **ABSTRACTS**

### **SECTION V. SOCIAL SCIENCE**

**SECTION V. SOCIAL SCIENCE**  
**Paper Session**  
**Thursday Morning 10:00 AM – 12:00 Noon**  
**KCC Room E**  
**Susan D. Herring, Presiding**

1. 10:00 AM ADDICTION'S PERSONAL AND SOCIETAL COSTS. *Susan Herring* and Bryan Kennedy, Athens State University. It is difficult for many people to understand the hold that addiction has on the alcohol or drug user. A Jungian analysis demonstrates that the ego of an addict is overcome and the individual becomes completely subjugated to the addiction. This paper focuses on current research on the effects of addiction on society and the individual. The results of a short survey are discussed, illustrating the depth of public awareness of addiction and the prevalence of personal knowledge of individuals who died due to substance abuse. Suggestions to help those dealing with addicts in the workplace are provided.
2. 10:20 AM LONG-TERM EFFECTS OF HARSH CHILDHOOD ENVIRONMENT ON THE MENTAL AND PHYSICAL HEALTH OF CHILDREN AND ADULTS. *Thomas Pieplow*, Bryan Kennedy, and Susan Herring, Athens State University. Members of the mental health profession have long recognized and researched the devastating effect of stress on humans and well as members of the animal kingdom. This research has provided a large body of worthwhile information that has been utilized in stress management efforts. This paper explores some of this research and focuses primary attention on the impact of a harsh early social and familial environment on the mental and physical health of children, and its continuation into adulthood and throughout the individual's life span.
3. 10:40 AM MULTIGENERATIONAL WORKPLACES. *Beverly J. Myers*, Stillman College. Many workplaces have employees from multiple generations. The primary aim of this presentation is to identify some significant differences in the five generations currently in the workforce. A secondary aim is to explore new ways for educators and employers to modify teaching approaches to improve collaboration and communication among the five generations of workers. Studies have shown each generation has varying ideas, values and experiences that impact collaboration and communication at work. Each generation has its own style of communicating; therefore, all workers must learn these differences to work effectively with their colleagues. Every worker in an organization must recognize the different characteristics of each generation, especially how each generation perceives and performs work, in order to collaborate and communicate effectively at work. Collaboration and open sharing of information create work cultures that encourage innovation, provide unrestricted access to work information, and support workers feeling their ideas and skills are

valued, which in turn leads to improved commitment and loyalty to coworkers and the organization as a whole.

4. 11:00 AM HIKING FEARS SCALE: SCALE VALIDATION STUDY. *Richard Hudiburg, Evelyn Swinney, Claire Martin, Sierra Hill, Madelyne Barnard, Micaela Rabl, and Larry Bates, University of North Alabama.* The purpose of this study was to establish preliminary construct validity for the Hiking Fears Scale that Hudiburg et al. (2015) developed to measure fears that hikers might experience while hiking in nature. The content of the scale's items was expanded from those investigated by Cobel et al. (2003) concerning fears of hiking alone for females. The scale's preliminary internal consistency reliability (Cronbach's alpha = .94) and factorial structure (two factors were identified: natural elements fears and performance issues fears) were reported by Schiavone et al. (2016). The accepted procedures for developing a measurement instrument is to establish construct validity through evidence of convergence and discriminant validity. For this purpose, the questionnaire used in the study included demographic information of participants, the Hiking Fears Scale and the Fear Schedule II (Greer, 1965) a potential convergent measure of general fear. Additionally, the questionnaire included two domain subscales from the Big Five 2 personality scale (Soto & John, 2017). One domain subscale used for discriminant validation was Openness to experience and the second domain subscale used for convergent validation was Negative emotionality. A sample of 290 hiker/backpackers participants responded to the questionnaire at either of two field research locations where hikers/backpackers gather. One location was in northern Georgia and the second one was in southern Virginia. There was preliminary evidence of construct validity for the Hiking Fears Scale based on correlation analyses. There was discussion of the use of the Hiking Fears Scale and proposals for future research.
5. 11:20 AM PRICE/COST ANALYSIS AND NEGOTIATION STRATEGY: WHAT ROLE DOES THIS PLAY IN THE ACQUISITION AND CONTRACT MANAGEMENT FIELD? *Charles Roberts, Bryan Kennedy, and Susan Herring, Athens State University.* The intent of this research is to briefly describe issues within the field of contract management associated with price and cost analysis as well as negotiation strategy. This case study was designed to explore potential issues associated with price and cost analysis as well as negotiation strategy, and to produce potential recommendations for solutions to the potential issues within the field of contract management. The results and recommendations for the specified issues will be contained within this case study. Issues pertaining to training, technology, regulations, and education will be seen, and these issues will factor into the efficiency of price and cost analysis as well as negotiation strategy.

**SECTION V. SOCIAL SCIENCE**

**Poster Session**

**Thursday Afternoon**

**KCC Atrium and Ballroom Foyer**

**Authors Set-up: Begins at 7:30 AM**

**Authors Present: 1:00-3:00 PM; Viewing and Judging**

**Susan D. Herring, Presiding**

6. **\*\*u** A SUMMARY OF AVAILABLE DATA ON CHILD ABUSE FOR THE NATION, ALABAMA, AND PIKE COUNTY. *Courtney Batchelor* and Christopher Bradley, Troy University. This poster presents information concerning national data on child abuse as reported in 2016 by the National Child Abuse and Neglect Data System, or NCANDS. The poster also includes a summary of data for the state of Alabama for 2016 and data collected for Pike County from the years 2012 to 2017. Trends in child abuse and neglect are discussed, with specific focus on trends in the state of Alabama and Pike County in Alabama.
7. **\*\*g** COMPLEX RELATIONSHIPS BETWEEN HEART RATE VARIABILITY, ANXIETY, AND COGNITIVE INTRA-INDIVIDUAL VARIABILITY. *Claire Demming*, Melissa Myers, Benjamin Hill, and John Shelley-Tremblay, University of South Alabama. Heart Rate Variability (HRV) can be defined as the difference between consecutive instantaneous beat intervals (RR) (Dimitriev, et al., 2016). Hansen et al., noted that subjects with high HRV performed better on tasks involving executive function and working memory. In experiments using milder psychological stressors there is an increase in HR and decreases in HRV (Cohen, H., et al., 2000). This study looks to expand on previous findings that HRV is related to cognitive demand (Luft, et al., 2009) by looking at an experimental condition that incorporates social stress. Participants consisted of 62 adults, ranging from 18-40. Participants completed the CNS Vital Signs (CNSVS) first. They were then attached to the BIOPAC MP30 system which measured their continuous HR. Participants relaxed for 5 minutes as a baseline. They were then asked to plan a speech to perform. The speech planning, used to induce short-term stress, lasted 10 minutes. Using the BIOPAC Student Software 4.1, a spectral band power analysis was performed on both conditions. Three power bands were examined: low frequency (LF), high frequency (HF), and very high frequency (VHF) as indexes of HRV. Those power bands were correlated, using Pearson's r, to the cognitive measures of Repeatable Battery for the Assessment of Neuropsychological Status and CNSVS. Results indicate a significant, negative correlation between the HF, and VHF Components of the HRV and the reaction time for correct trials on the CNSVS POET task. Anxiety, as indexed by the STAI, correlated positively with errors on CNSVS RT tasks as well. These analyses could potentially have neuropsychological and cardiac health implications.
8. **\*\*g** THE BRAIN IN LOVE: SELF-DIFFERENTIATION IN ASSOCIATION WITH RELATIONSHIP QUALITY. *Reagan Thomas*, Jack Shelley-Tremblay, and Harvey Joanning, University of South Alabama. Bowenian Theory states that behavior in families is like one "emotional unit" & one member's emotions affect the whole group.

Evolutionary theory suggests that due to this emotional connection, families were better able to support one another. However, when anxiety increases, emotional interactions become more stressful (Kerr, 2000). Bowen's theory has demonstrated a verifiable change in marital and family therapy, yet some couples are unresponsive to treatment regardless of using Bowen's approach. These couples have become habituated to conflict and thus are conditioned to a hyper-aroused state (Joanning). The long-term effects of this causes couple's to use maladaptive communication, creating less satisfaction in the relationship. This version of the Brain in Love study is an online survey only format. Individual participants are USA undergraduate students enrolled in a psychology course. Individuals qualify to participate if they have been in a relationship for at least 6 months. Participants are recruited and sign-up using USA SONA online. They'll be redirected to Qualtrics to complete all self-report measures. Data will be analyzed using SPSS and Microsoft Excel. Participants are given course credit for participation. Currently, there are n=96 respondents, researchers hope to reach n=150 before the data is analyzed. This study seeks to determine how qualities of differentiation impact anxiety levels and relationship adjustment. Investigators would also like to examine the effect of personality and self-esteem on differentiation. Results can help practitioners determine how to prevent conflict habituation so that couples will respond to treatment.

9. **NONDIRECTIVE PLAY THERAPY FOR CHILDREN WHO EXPERIENCE ADVERSE CHILDHOOD EXPERIENCES.** *Beverly Myers* and *Sandra Jemison*, Stillman College. Adverse Childhood Experiences (ACEs) are early traumatic events that lead to negative mental and physical health outcomes. In 2016, one in four American children suffered from emotional, physical, or sexual abuse and/or emotional and physical neglect. Many of these children experienced household dysfunction, including exposure to divorce, substance use, mental illness, domestic violence, and the incarceration of relatives. Studies show children who experience early trauma are at increased risk for being arrested as juveniles, becoming teen parents, and dropping-out of high school. They are at increased risk of smoking, alcoholism, drug abuse, and engaging in high-risk sexual behaviors as teenagers and young adults (CDC, 2018). Nondirective play therapy can offer children who experience abuse, neglect, and household dysfunction a safe way to express and work through unconscious conflict, which in turn, may lead to improved mental and physical health outcomes and an improved quality of life. Nondirective play therapy is based on the belief that children have the internal drive to achieve wellness and they are capable of directing their own process of healing.
10. **COMMUNICATION AND COLLABORATION IN A MULTIGENERATIONAL WORKFORCE.** *Beverly Myers*, Stillman College. The primary aim of this presentation is to identify some significant differences in the five generations that currently make-up the modern workplace. A secondary aim is to explore ways to improve oral communication and collaboration among the five generations. According to the American Hospital Association (2014), the five generations that make-up the current workplace are the Traditionalists or Silent Generation born in 1945 or earlier, Baby Boomers born between 1946 and 1964, Generation X born between 1965 and 1976, Generation Y or Millennials born between 1977 and 1995, and Generation Z or Centennials born in 1996 or later. Studies show each generation has varying ideas, values and experiences that impact oral communication and collaboration in the workplace. Each generation has its own preferred style of communicating, therefore, all workers must learn these differences



to work effectively with their colleagues. Workers must recognize the different characteristics of each generation, especially how each generation perceives and performs work, in order to communicate effectively and work in teams to get the job done. Effective oral communication, collaboration and open sharing of information create work cultures that encourage innovation and support workers feeling their ideas and skills are valued, which in turn, leads to increased commitment and loyalty to one's coworkers and to the organization as a whole.

**\*\*u or \*\*g** Denotes presentation entered in student competition as an undergraduate or graduate student, respectively.

## ABSTRACTS

### SECTION VI. ANTHROPOLOGY

SECTION VI – ANTHROPOLOGY  
Paper Session  
Thursday Morning, 10:30 – 11:30 AM  
KCC Room D  
Jason Mann, Presiding

1. 10:30 AM PHYLOGENETIC IMPLICATIONS OF THE BODY SHAPE OF STW 573, AN EARLY *AUSTRALOPITHECUS* FROM STERKFRONTEIN, MEMBER 2 (~3.67 Ma). *Jason Heaton*, Birmingham-Southern College. Body shape is an important part of understanding an animal's lifestyle, as it can serve as an indicator of its brain/body size dynamic, diet, metabolism and locomotion. However, among fossil fauna, the issue is complicated, as complete bone lengths are often poorly represented. The unparalleled completeness of the *Australopithecus* skeleton (StW 573, or Little Foot) from Member 2 of Sterkfontein will allow us test hypotheses about the evolution of the hominin body shape and may provide clues to the phylogenetic place of the South African fossil hominins. Typical of South African *Australopithecus* species, StW 573 possesses a smaller body mass (33.1 kg) than its east African congener, *A. afarensis* ( $\bar{x} = 41$  kg), but with a similar brain-to-body size, or encephalization quotient (EQ = 2.5). Relative to body size, StW 573's posterior teeth are considerably smaller (Megadontia Quotient, or MQ = 1.4) than later South African archaic species, such as *A. africanus* and *A. robustus* (MQ = 2.0 and 2.2, respectively) and more like that of the earlier occurring *A. anamensis* (MQ = 1.4). Therefore, data suggest that an early adaptive shift may have occurred, as the eastern and southern *Australopithecus* diverged, resulting in dietary, and perhaps range, differences between the groups. Consequently, after the initial migration, the three major *Australopithecus* species of South Africa – *A. africanus*, *A. robustus* and *A. sediba* – may have evolved in isolation until environmental change and a later hominin migration (~2.0 Ma) brought *Homo* into the area.
2. 10:50 AM \*\*u Study of cultural interaction through artifacts at trash site. *Alagappan Ramanathan*, Troy University. There has been several anthropology field schools done by Troy students at trash site which is located near the pea river. This site predates to middle archaic with well-preserved artifacts like pottery, projectile points and poverty points. And several artifacts which don't belong from the local province play significant role in studying and analysis of the cultural interaction. And the detailed data and photograph of these artifacts from trash site will set the cultural time line in order. The artifacts design and pattern will be the ultimate key in figuring the actual truth about what really happened here.
3. 11:20 AM \*\*u A Preliminary Report on a LASER Guided Archaeological Survey in the Talladega National Forest. *Zachary Smith*, Troy University. The LASER method uses a

proprietary algorithm created by Dr. Xutong Niu and Jason Mann of Troy University which locates landforms that are highly probable for containing cultural resources. In March of 2018 a EF-3/4 Tornado damaged 5,671 acres of the Talladega National Forest. Troy University Archaeological Research Center was contracted by the United States Forest Service to Determine damage to existing sites within the tornado damage path as well as surveying areas indicated by the LASER scan. This report will focus on the December 2018 field work in the Shoal Creek district of the Talladega National Forest. This report will detail the LASER scanning process, field methodology, laboratory methodology, and preliminary results of the project.

## **SECTION VI – ANTHROPOLOGY**

### **Poster Session**

**Thursday Morning, 11:30 AM -- Noon**

***KCC Atrium and Ballroom Foyer***

**Jason Mann, Presiding**

4. **\*\*u** FAUNAL ANALYSIS OF A SAMPLE FROM A PREHISTORIC SHELL MIDDEN IN DALLAS COUNTY ALONG THE ALABAMA RIVER. *Riley Sombathy*, Bill Grantham, Jason Mann, and Johnathan Miller, Troy University. An excavation of a prehistoric midden near Selma revealed a prehistoric shell midden which, based on artifact analysis, dates back to 1050 CE. This research focuses on three distinct aspects of the excavation: the artifacts, the terrestrial faunal remains, and the bivalve and gastropod remains. For the artifacts, basic quantification and analysis was performed and used for relative dating purposes. The terrestrial faunal remains consist of turtle, snake, and deer bones, which were counted. Lastly, the mussel remains were tabulated and analyzed for abundance and comparative analysis.

**\*\*u or \*\*g** Denotes presentation entered in student competition as an undergraduate or graduate student, respectively.

## **ABSTRACTS**

### **SECTION VII. STEM EDUCATION**

#### **SECTION VII: STEM EDUCATION**

##### **Paper Session**

**Thursday Afternoon 2:00 – 4:40 PM**

***KCC Room B***

**J. Wayne McCain, Presiding**

1. 2:00 PM **CREATING PODCASTS FOR PUBLIC EDUCATION.** *Mel Blake*, University of North Alabama. Podcast offer a unique way to reach the general public about science. Typically, they are short audio files that describe news and information about science. At UNA Planetarium we have been contributing podcasts to the 365 Days of Astronomy podcasts. We have learned a lot about the process, from generating ideas for the podcasts, script writing and editing the audio files. We will describe some of the lessons learned about the process and encourage people to create their own podcasts.
2. 2:20 PM **\*\*u ASSESSING STUDENT PERCEPTIONS OF INTERNATIONAL TEACHING ASSISTANTS.** *Rachel Rock*, Sarah Adkins, Jeff Morris, and Samiksha Raut, University of Alabama at Birmingham. The University of Alabama at Birmingham (UAB) is acclaimed for its student body diversity, with international students from over 90 countries comprising 5% of UAB's student body. Less attention is paid, however, to the downstream effects of the international students' assimilation. An ideal population with which to explore these effects are graduate students, who often teach or lead undergraduate lab classes. This IRB approved study investigated student perceptions of their international teaching assistants across different introductory STEM classes (Biology, Chemistry, Computer Science, and Physics) using mixed-methods. We investigated undergraduate attitudes of Graduate Teaching Assistants (GTAs), the effect GTAs have on the classes, and GTA's perceptions of themselves and their teaching style. Pre and post questionnaires (adapted from validated surveys from Fox and Fuselier) were administered to students at the start and end of their semester, respectively, and end-of semester focus group sessions were offered. Results from preliminary studies done in Introductory Biology II classes showed that over 50% of students had experience with classes led by International GTAs and 20% of those students cited communication failures as difficulties in the class. International GTAs, however, often cited that their accent and nationality had little effect on the student perceptions and class outcomes. Ongoing work is exposing similar discrepancies. This study is part of a larger effort to better understand student perceptions of international educators and translate lessons learned to inclusive educational environments for all.
3. 2:40 PM **\*\*u MALAYSIA AIRLINES FLIGHT 370 – A FAILURE OF RISK**

MANAGEMENT? *Katherine Brewer*, Carter McCain, and J. Wayne McCain, Athens State University. The disappearance of Malaysia MH370 on March 8th, 2014 is widely viewed as one of the greatest mysteries in the history of aviation to date. Two-hundred and thirty-nine souls are lost and unaccounted for. What could have possibly caused a huge, modern-day passenger airplane to simply disappear into the night? What unusual circumstances were recognized that might point to what caused this event? Were proper risk avoidance measures in place and were these policies followed? What did the official accident report reveal and conclude? This paper addresses these questions and more, including what one prominent investigator has surmised is the most likely truth of what really happened. The accident review process was examined along with what might have been effective risk management techniques, all in the context of an aircraft safety and security course of study.

4. 3:00 PM \*\*u STEMSAT1 - RADIO ASTRONOMY CUBESAT, AN UPDATE. *Collin Rogers McCain*, Calhoun Community College; J. Wayne McCain, Athens State University. Over the past two years, students and faculty from Athens State University, Calhoun Community College, the University of North Alabama, along with the Society of Amateur Radio Astronomers (SARA) have been studying the feasibility and initial mission planning for a radio astronomy CubeSat in a low-Earth orbit to study low frequency signals from space that do not reach Earth's surface due to blockage by our atmosphere. The mission would involve students from kindergarten through college-level in various scientific and management aspects of the flight from design, assembly, and launch through data gathering and analysis. This paper provides an update on progress since last year's report and shares future plans for this potentially STEM-rich, space-oriented project.
5. 3:20 PM \*\*u MARS CHALLENGES - *INSITU* PLANT FARMING. *Amelia Claire McCain*, Athens Intermediate School; J. Wayne McCain, Athens State University. Challenges of the various Humans To Mars (HTM) programs, particularly those that involve extended stay time or even colonization, are mostly centered around providing the essential resources required for sustaining human life. One of the most critical resources is food. Recently, the Chinese rover landed on the far-side of the Moon sprouted cotton seeds as part of an on-board biology experiment. The sprouts later perished due to the extreme conditions on the lunar surface during the lunar 'night'. Mars offers many of the same obstacles including extreme temperature swings, high radiation exposure, and essentially a near vacuum atmosphere with only low levels of Carbon Monoxide. Martian regolith (soil) may not be suitable for germination and growth of typical food plants. This paper examines these difficulties with an emphasis on a comparison of Martian vs. Earth soil compositions and presents preliminary results of an initial attempt at growing plants with simulated Martian soil.
6. 3:40 PM LOW-RISK FORMATIVE ASSESSMENTS AS AN EARLY INDICATOR OF AT-RISK STUDENTS IN A HUMAN ANATOMY COURSE. *Drew Hataway* and T.W. Woolley, Samford University; *Connie Hataway*,

University of Alabama at Birmingham; and Mary Anne Garner, Judson College. Nationally, undergraduate students fail Anatomy and Physiology courses at some of the highest rates compared other courses at the undergraduate level. Formative evaluation guides future learning by assessing the quality of student achievement while the student is still in the process of learning. It serves to gauge student progress toward meeting instructional objectives with the intent of improving teaching and learning. The use of formative assessments was introduced in an undergraduate human anatomy course intended for students majoring in a variety of allied health fields. The assessments consisted of ten questions that mimicked the style and content of the summative assessments at the end of each unit. In response to the current debates related to formative assessments, immediately following administration the assessments were checked for accuracy and all correct and incorrect answers were discussed. Scores were not recorded as a separate assignment or quiz grade but rather as bonus points to be added to the summative assessment score in an effort to remove the stigma of quizzes and utilize the incentive of potential bonus points. The results suggest that at risk students can be identified before the first summative assessment through the use of formative assessment. Formative assessments, used as described in this abstract, have the potential to improve students' metacognitive abilities and increase learning.

4:00 PM      **BUSINESS MEETING: Elect a Section Vice-Chair for the 2019-2021 term**

**\*\*u or \*\*g** Denotes presentation entered in student competition as an undergraduate or graduate student, respectively.

## SECTION VII: STEM EDUCATION

### Poster Session

Thursday

*KCC Atrium and Ballroom Foyer*

**Authors Set-up: Begins at 7:30 AM**

**Authors Present. 1:30 – 2:00 PM, Viewing and Judging**

**J. Wayne McCain, Presiding**

1. THE INFRASTRUCTURE OF HEALTH INFORMATICS: LAYING THE TECHNOLOGY FOUNDATION. *David Robbins*, Samford University. Since practitioners of informatics generally enter the field with either domain or technology expertise already in hand, informatics educators face the challenge of constructively teaching to multiple skill levels simultaneously. This poster presents the redesign of an introductory course designed to enable students with diverse technology backgrounds to advance together, while simultaneously enabling those with minimal technical skills to develop confidence in their approach to the information technology foundations of informatics.
2. **\*\*g** INTRODUCING THE RESEARCH ON STEM EDUCATION NETWORK. *Sarah Adkins*, Samiksha Raut, and Jeffrey Morris, University of Alabama at Birmingham. A growing body of research indicates making small learner-driven adjustments in the classroom can dramatically improve students' knowledge retention as well as their perception and investment in the sciences. Educational research in evidence-based teaching is crucial in assessing active-learning techniques, and therefore is essential in positively influencing teaching practices which benefit students, the university, and our society. However, there exist many gaps in accessibility of resources and opportunities for collaboration for interested educators. The Research on STEM Education Network (ROSE) exists as that platform to encourage collaboration and further research in STEM education. Like flowers bear seeds to expand their species, ROSE aims to: 1.) encourage cross-discipline discussions and collaboration of STEM education researchers and 2.) provide a platform for the dissemination of resources for STEM educational research. In practice, ROSE members (which include undergraduates, graduates, postdocs, staff and faculty) meet over journal club luncheons, invited seminar talks, and off-campus socials. ROSE makes available to its affiliates educational research information, including relevant education literature, links to national conferences and chances to network, funding opportunities, and information about IRB applications and human subjects research. ROSE chapters currently exist at the University of Alabama Birmingham, University of Texas El Paso, University of Alaska Fairbanks, Jefferson State Community College, and Birmingham-Southern College with growing success among members (e.g. conference presentations and publications). We invite interested educators to start their own chapter at their own universities to join the discussion around evidence-based education.
3. **\*\*u** REFORMING PEER-LED LEARNING ASSISTANTS THROUGH

PROFESSIONAL DEVELOPMENT TRAINING IN A FRESHMAN

INTRODUCTORY BIOLOGY CLASS. *David Verhine, Gabby Richards, James Boyett, Sebastian Schormann, and Samiksha Raut, University of Alabama at Birmingham.*

National calls for undergraduate education reform have prompted the need towards active engagement practices in the classroom with an intent to decrease the attrition in Science Technology, Engineering and Mathematics (STEM) gateway courses. Besides, it has been very well recognized that peer-learning groups play a critical role in implementing active-learning practices in the classroom and beyond. Very few studies to date have explored the impact of these peer-led sessions in the light of pedagogical training imparted to the undergraduate peer learning assistants in a typical introductory biology class. This study therefore aims at exploring the effects of professional development on peer-led learning assistants. A mixed methods approach will be utilized to assess the efficacy of this professional training. We hope that findings from this study will enable us to make a recommendation to other educators on training their learning assistants in evidence-based practices as an effective way to reduce STEM attrition from gateway courses like freshman introductory biology classes.

**\*\*u or \*\*g** Denotes presentation entered in student competition as an undergraduate or graduate student, respectively.



# ABSTRACTS

## SECTION VIII. ENVIRONMENTAL AND EARTH SCIENCE

### SECTION VIII – ENVIRONMENTAL AND EARTH SCIENCE

Paper Session

*KCC Room D*

Thursday afternoon, 2:00 –4:00 PM

Steven Schultze, Presiding

1. 2:00 PM ANOTHER DAM PROJECT: REMOVING THE SUCARNOCHEE RIVER DAM. *Brian Burnes*, Alabama Academy of Science. A low-head dam was removed from the Sucarnochee River at Livingston, Alabama. This presentation recounts a history of the dam and the many individuals and groups involved in its removal.
2. 2:20 PM \*\*u THUNDERSTORM DEVELOPMENT AT THE SEA AND BAY BREEZE COLLISIONS. *Ashlyn Shirey* and Sytske Kimball, University of South Alabama. Sea breezes (SB) and bay breezes (BB) are common in the Mobile Bay region during the warm season: May through October. SBs and BBs form in response to a land-sea temperature gradient – a difference in temperature between land and water. SBs and BBs frequently occur at the same time in Mobile County due to land-sea temperature gradients between the land and the Gulf of Mexico and between the land and Mobile Bay. This occurrence leads to a collision between the SB and BB in the southeast corner of Mobile County that could lead to thunderstorm initiation at the collision zone. Thunderstorm (convection) development at the collision point depends on atmospheric instability, background environmental winds, and magnitudes of land-sea temperature gradients. A better understanding of what leads to thunderstorm development can help forecast location and time when storms form to prevent damages and injuries. In this study, KMOB radar data from the years 2010-2013 was examined to see which days had SBs and BBs. They were also categorized by whether convection developed or not. The days that had both SBs and BBs were also examined to see if convection occurred at the collision point. The number of non-convective days peaked during the months of September and October while the number of convective days peaked during July and August. The instability parameters, environmental winds, and land-sea temperature gradients were all calculated for each day. As expected, the convective days had instability parameters that indicated a more unstable environment compared to non-convective days. The high number of non-convective SB and BB days in October is due to the strong temperature gradients, but the stable conditions during that month does not allow for convection to develop. While July and August have relatively smaller land-sea temperature gradients, the more unstable environment during these months is why there is a peak of convective SB and BB days. Convection developing along the SB and BB front is highly dependent on instability parameters. However land-sea temperature gradients and the speed and direction of the environmental winds seem to be of secondary importance. The

instability of the atmosphere is crucial to thunderstorm development because even with strong temperature gradients and favorable wind patterns, if the environment is too stable then thunderstorms will not develop.

3. 2:40 PM **\*\*u IDENTIFYING SEA AND BAY BREEZE DRIVEN CONVECTION AND COMMON LOCATIONS FOR INITIATION IN MOBILE COUNTY, ALABAMA.** *Samantha Darring* and Sytske Kimball, University of South Alabama. Sea and bay breeze driven thunderstorms are a common occurrence along the Gulf of Mexico Coast every summer. These summertime thunderstorms pose a problem to forecasters, due to the difficulty of predicting the exact location of development. These storms can cause flash flooding, strong winds, and plentiful lightning, that can cause serious damage to property and even life. However, in terms of agriculture, these thunderstorms can be beneficial to farmers who count on this almost daily rain for their crops. This research will identify the most common location where these storms initiate due to sea or bay breezes in Mobile County, Alabama. In this project, sea and bay breeze driven convection (i.e. thunderstorms) will be identified for the years 2009, 2010, 2011, and 2012 using radar data from the Mobile Doppler weather radar (KMOB WSR-88D). Three different triggering mechanisms will be analyzed in order to identify the reasons why the convection might form in a given location. These mechanisms include the sea and bay breeze interaction with elevation, the collision of sea and bay breezes, and the vertices in the sea or bay breeze formed by the natural shape of the coastline. The locations of all three of these convective initiation types were mapped using ArcGIS to help identify the most common location for the development of these summertime thunderstorms. The results indicate that most sea breeze driven thunderstorm storms occur in the lower part of Mobile County. From radar imagery, it was observed that two vertices typically occur in the sea breeze front in Mobile County. Convection was observed to form in these vertices as well as in the southeastern part of the county where the sea and bay breeze collide. The ArcGIS maps show that the vertices and the interaction between the sea and bay breeze are the most common producers of sea breeze or bay breeze driven convection. The sea or bay breeze interaction with elevation, as show in the ArcGIS maps, is not as evident as the vertex mechanism. This is possibly because the majority of the storms formed in the lower 13-15 miles of the country, before higher elevations occur.
4. 3:00 PM **SUMMER IN THE CITY: HEAT TRENDS IN URBAN ALABAMA, 1957-2017.** *Stephen Tsikalas*, Kennedy Delap, Jacksonville State University; Eastern Washington University. In this study, we focus our attention on urban regions in the State of Alabama to create a better understanding of changing summer heat trends. Rising summer temperatures, prolonged heat waves, and high heat index values are cause for public health concerns. Additionally, an increase in summer heat poses a stress on energy demands, costs to consumers, and health risks to the most vulnerable populations. Alabama is within the “warming hole” of the twentieth century warming trend in the U.S.; however, we hypothesize that summer urban temperatures have been on the rise over the past 60 years. To test our hypothesis, we analyze daily maximum and minimum temperatures for the months of June, July, and August between two, thirty-year time periods: 1958 to 1987 and 1988 to 2017. We also calculate cumulative summer cooling degree days (CDD) for each year, June 1st through August 31st. Statistical comparisons suggest a rising maximum and minimum temperature and CDD for 80 percent of the cities in this study ( $\alpha = 0.05$ ).

5. 3:20 PM \*\*u COMPARISON OF PEACH RESPONSE TO WEATHER IN ALABAMA AND MICHIGAN. *Jerel Foreman* and Steven Schultze, University of South Alabama. Specialty crops are dependent on the climates that they grow in. This study seeks to show the differences between growing peaches in state of Alabama and the state of Michigan. Peach production is an important part of both states' agricultural economies, thus it is important to better understand the complex interaction between these crops and their environments. We placed 6 EXTECH RHT10 weather microloggers in radiation shields and record temperature, humidity, and dew point in a peach grove in Fairhope, Alabama and Berrien Springs, Michigan recording data every five minutes for the early growing seasons for peach trees. Ultimately, we found that the climates of Alabama and Michigan are different even though the crops grew at the same rate. Peach production is an important part of both states' agricultural economies; thus, it is important to better understand the complex interaction between these crops and their environments.
6. 3:40 PM \*\*u RESULTS FROM YEAR TWO OF THE SOUTH ALABAMA HOPS PROJECT. *Wayne Williams* and Steven Schultze, University of South Alabama. *Humulus lupulus*, or hops as known to many, are a plant species which grows on a vine and is used in the production of alcoholic beverages, mainly beer. These plants are generally grown in between the 35- and 55-degree latitude lines, and thrive greatly in the Pacific Northwest of the United States. The goal of this experiment was to see if hops could in fact be grown in the lower Alabama region, closer to the 30-degree latitude line. In the first year( 2017) of the experiment, we attempted to grow 15 hops vines. We were not able to obtain a crop due to many mistakes and unforeseen circumstances that had come about. This being the second year of production, things have drastically improved in every manner of the project. There has been a new irrigation system installed, and we have grown the hops and fertilized them in a completely different way. We have used the chinook, cascade, Kirin 2, and southern brewer varieties of hops. We have upped production from 15 vines to about 50 vines. This year we have had great blooming results of hops. Every variety of plant has bloomed at some point, but some in different time stages than others. Many have been picked and have continually bloomed more hops after being picked. All of the crops are fresh and usable product, as much as 89% of the plants have produced hops! This was something we did not foresee working out as well as it did. By finding success, we have high outlooks for this experiment and bringing hops to our local economy in mass production someday in the future. Hops will be continued in research for years to come.

**4:00 PM BUSINESS MEETING: Elect a Section Vice-Chair for the 2019-2021 term**

\*\*u or \*\*g Denotes presentation entered in student competition as an undergraduate or graduate student, respectively.

## **SECTION VIII – ENVIRONMENTAL AND EARTH SCIENCE**

### **Poster Session**

**Thursday Afternoon, 1:00 – 2:00 PM**

***KCC Atrium and Ballroom Foyer***

**Authors Set-up: Begins at 7:30 AM**

**Authors Present: 1:00 – 2:00 PM; Judging and Viewing**

**Steven Schultze, Presiding**

1. **DENDROCLIMATIC RELATIONSHIPS ACROSS THE GEOGRAPHICAL RANGE OF SUGAR MAPLE.** *Kaylen Bendolph*, University of West Alabama; *Carolyn Copenheaver*, Virginia Tech; *Ketia Shumaker*, The University of West Alabama. Climate change poses one of the largest threats to forest ecosystems in North America, but we do not fully understand how current climate influences tree growth. The objective of this study was to connect sugar maple radial growth to temperature across a portion of the geographic range. Monthly temperature data were correlated with sugar maple tree-ring width data from 12 sites in the United States and Canada. Current and prior year's summer temperatures were the main drivers of sugar maple radial growth. Sites from the central portion of sugar maple's range were less responsive to temperature than sites at the northern and southern range limits. These results suggest that climate change is likely to affect sites at the northern and southern limits more than in the central portion of sugar maple's range.
2. **A META-ANALYSIS TO COMPARE SOLUTIONS TO BIRD WINDOW COLLISIONS.** *Jessica Colbaugh*, Robert Gitzen, and Christopher Lepczyk, Auburn University. Bird window collisions happen throughout the year, taking place in rural and urban habitats with deaths documented for many groups of birds. Birds are unable to perceive glass itself as a barrier, and instead are attracted to the reflections on the surface or suitable habitat on the other side. Window treatments have been developed to reduce collisions, and some comparisons have been done within studies. However, there hasn't been a systematic review of developed solutions. This meta-analysis was designed to provide an overall effect of treatments as well as systematically compare different window treatments using rate ratios to find which solutions had the best effect for reducing collisions. Following PRISMA guidelines we found eight studies, for a total of 34 effect sizes. A random effects model comparing each solution identified a commercially available one-way glass called CollidEscape, UV absorbing and reflecting alternating pattern to completely cover the window, and vertical stripes of UV absorbing 2.5 cm wide spaced 5 cm apart as the top solutions. A mixed effects model was used to moderate and compare grouped treatments, grouped based on physical similarities. The mixed effects model accounted for a fair amount of heterogeneity and identified glossy black horizontal stripes (2 mm thick and spaced 28 mm apart) and parachute cords as the best options. The overall effect was that the treatments reduced collision rate by about 80% compared to clear glass. The solutions found to be effective are feasible for application anywhere from homes to businesses.
3. **WARMING HOLES AND POLAR JETS: TEACHING CLIMATE CHANGE IN THE SOUTHEASTERN U.S. BY EMBRACING THE REGIONAL ANOMALIES TO GLOBAL WARMING.** *Gregory Buckley* and *Melissa Moore-Driskell*, University of North Alabama. Despite overwhelming scientific consensus that the earth's climate is changing rapidly, and that human activity is largely responsible, there remains a significant percentage of the population that remains skeptical. It is especially challenging to teach about climate change in a region that has not experienced the same warming trends as the rest of the world. Such is the case in the Southeast United States, where a "warming hole" experienced significant cooling beginning in the late 1950's while the rest of the world was warming. This region still falls below average global

temperature anomalies, suggesting that the warming hole still exists. Additionally, progressive warming of the Arctic has resulted in greater instability of the northern polar jet stream, which can bring frigidly cold winter weather to the southeastern United States. Climate system drivers are complex; however, by addressing this complexity and encouraging exploration into the causation of anomalous evidence on a regional scale, it is easier to explain the broader patterns and implications of global climate change. This teaching/learning module reinforces inquiry-based learning, critical thinking, and analytical skills while introducing students to some of the basic concepts of the Earth's climate. This is accomplished through the analysis of archived local weather data in the southeastern U.S. extended over decades to demonstrate the difference between weather and climate. Comparisons are made between historical local temperature trends with temperature trends outside of the "warming hole". Students will 1) determine what available weather data are most informative to examine long-term climate change; 2) examine several of the theories to explain why regional trends differ from global trends, and 3) examine the drivers of our regional climate, particularly the importance of the jet stream.

4. **\*\*u** TEMPORAL CHANGES IN THE RELATIONSHIP BETWEEN CLIMATE AND RADIAL GROWTH OF SUGAR MAPLE. *Makael Harris* and *Ketia Shumaker*, The University of West Alabama; *Carolyn Copenheaver*, Virginia Tech. Sugar maple radial growth is determined by environmental conditions. The objective of this study was to analyze the changes over time in the relationship between sugar maple annual radial growth and precipitation in 12 study sites across the U.S. and Canada. Results show a declining influence of precipitation on sugar maple radial growth post-1970. This implies that environmental factors other than precipitation are increasing in their influence on sugar maple growth.

**\*\*u or \*\*g** Denotes presentation entered in student competition as an undergraduate or graduate student, respectively.

## **ABSTRACTS**

### **SECTION IX. HEALTH SCIENCES**

#### **SECTION IX: HEALTH SCIENCES**

##### **Paper Session**

**Thursday Morning, 8:00 – 10:40 AM**

**KCC Room A**

**Ronald N. Hunsinger, Presiding**

1. 8:00       ALABAMA ASTHMA COALITION (AAC): EDUCATION, HEALTHCARE, & ADVOCACY THROUGH STATEWIDE PARTNERSHIPS. *Ellen Buckner*, Samford University; *Linda Gibson*, Auburn University. The Alabama Asthma Coalition (AAC) reorganized in 2017 to connect the network of professionals and organizations dedicated to asthma care. More than 50 organizations and individuals are actively collaborating including the Alabama Department of Public Health (ADPH), hospitals, school nurses, asthma/allergy/pulmonary specialists, respiratory therapists, pharmacists, certified asthma educators, and non-profit organizations such as the American Lung Association (ALA). Members represent all geographic areas of the state and a wide variety of backgrounds and experiences. The mission is to identify and support best practices in education, healthcare, and advocacy. The AAC met in face-to-face and virtual meetings in 2017-2018 and identified priorities for action. It established an interactive online site to connect members of upcoming conferences, professional development sessions, and grant opportunities. Initial priorities were determined in breakout groups and all three groups indicated the need to involve more stakeholders and community participants. Education: A survey of Alabama school nurses was implemented in summer 2018 to assess their asthma perceptions and needs. This survey provides baseline data on tools needed to support effective collaboration in asthma self-management. Healthcare: The AAC collaborates with the community, health care providers, and schools across the state to address asthma management barriers such as encouraging common use of an Asthma Action Plan in primary healthcare clinics. Advocacy: Priorities include increasing public awareness, promoting Tobacco-free environments, and funding asthma care/education. The AAC is one of many state coalitions organized under the CDC Asthma Programs in mid-2000s. The coalition continues today as interprofessional volunteers build our agenda. We will highlight the impact of the coalition in its second year of renewal, and will address partnership plans and strategies for upcoming years. Priorities for each area are open to continuing discussion and collaboration.
  
2. 8:20       \*\*g ENDOTHELIAL TO MESENCHYMAL TRANSITION IN PULMONARY ARTERIAL HYPERTENSION. *Mayen Gonzalez*, *Rebekah Morrow*, *Jonathan Brown*, *K. Adam Morrow*, and *Audrey Vasauskas*, Alabama College of Osteopathic Medicine. Pulmonary arterial hypertension (PAH) is an elusive, yet serious constrictive pulmonary

vascular disease with grim prognosis. Treatment options are limited due to patients' advanced stage of disease at time of presentation. Emerging evidence suggests that PAH develops through a cancer-like progression. Epithelial-to-mesenchymal transition, a hallmark of cancer, is associated with cells' ability to resist anti-proliferative signals. Pulmonary arterial endothelial – to – mesenchymal transition (EndMT) has been implicated in PAH progression and severity, but the mechanisms driving this process remain to be elucidated. It is well-established that mutations in the bone morphogenetic protein receptor 2 (BMP2) predispose individuals to development of PAH. Our research investigates the possible relationship between aberrant BMP2 signaling in pulmonary artery endothelial cells and End-MT in these cells. Here, we discuss preliminary evidence for End-MT in PAECs and possible mechanisms for this reprogramming. Supported by NIH1R15HL137135-01A1

3. 8:40      **\*\*g AN ERP STUDY OF THE NEUROPHYSIOLOGICAL EFFECTS OF VISUAL WORD RECOGNITION.** *Donald Knapp*, and Jack Shelley-Tremblay, University of South Alabama. Prior research on visual word recognition shows a facilitative effect during several visual word recognition tasks when considering phonological neighborhood density. Source localization will be used on event related potentials (ERP) to see which neural networks are contributing to this effect. The subjects decided whether a phrase was a word or nonword while ERPs were recorded. These phrases varied across phonological neighborhood density (PND). The analysis of the ERPs will be done using MATLAB's EEGLab toolbox and the Source Information Flow Toolbox (SIFT). This allows for modeling a causal electrical flow from several sources over the course of three seconds. Previous results have shown that words with a higher PND were responded to more rapidly compared to the lower PND words. Words with lower PND also had a higher voltage during the N450 component. This may indicate additional semantic processing was required for the lower PND words due to a comparatively lower amount of phonological activation. This study has implications for language development and reading.
  
4. 9:00      **THE SECOND VICTIM PHENOMENA: SUPPORTING LABOR & DELIVERY NURSES AFTER A SEVERE MATERNAL EVENT.** *Amy Davis*, University of South Alabama. *Problem:* The national increase in maternal morbidity and mortality, influencing the second victim phenomena, requires organizational evaluation of the patient safety culture. Policies and practices are inconsistent related to organizational support after a severe maternal event for nurses working in labor and delivery. A children's and women's hospital in the southeast United States identified the need for a structured protocol and policy. *Purpose:* The project purpose was to assess implementation of the first component of the Support after a Severe Maternal Event Patient Safety Bundle through the selection of a unit-based protocol and evaluate barriers to implementation. A secondary aim was to provide nursing education on the bundle and purpose of organizational support. *Approach:* The first component was implemented using the Clinician Support Toolkit for Health Care. Recommendations included: (a) evaluate current organizational safety culture and policies, (b) evaluate effectiveness of unit-based drills, and (c) select a unit-based protocol. A multidisciplinary project team was assembled to participate in planning and evaluating departmental readiness. Nurses received education on the bundle, the protocol, and just

culture. *Results:* The assessments revealed a weakness in organizational practices and policies. Positive feedback was received from staff education sessions. A final assessment revealed reasons to reorganize the plan for progression with the remaining components of the bundle. *Implications for practice:* Successful outcomes for nurses and the organization when an event occurs requires planning to prepare for the emotional and psychological responses of the second victim. The bundle provides strategies to improve patient safety and organizational response.

5. 9:20       \*\*g IMPROVING CARE FOR PEDIATRIC PATIENTS WITH ASTHMA IN THE EMERGENCY DEPARTMENT: A QUALITY IMPROVEMENT PROJECT. *Ashleigh F. Bowman* and Lisa Dailey, University of South Alabama. *Objectives:* To examine whether specific asthma education and providing an individualized asthma action plan (AAP) at the time of discharge would impact future return visits to the emergency department (ED) and/or hospital admissions. Additional outcomes include follow-up with the primary care provider (PCP) and increased caregiver knowledge on a pre- and post-assessment. *Methods:* Patients ages 5 to 18 years were identified for inclusion in the project by nursing if they presented to the ED with a primary complaint of acute asthma exacerbation. Parents completed the pre-test of the Asthma Knowledge Questionnaire on arrival. At discharge, families were supplied an individualized AAP by the provider, which also served to guide discharge education. Thirty days following the initial ED visit, a follow-up phone call was completed to determine if the patient had PCP follow-up and/or was prescribed an inhaled corticosteroids (ICS), if he or she qualified per guideline recommendations. *Results:* Seventy-two patients were ultimately identified for inclusion. Over 90% received an AAP at discharge. Thirty-eight patients completed all questions on the pre- and post- questionnaire without a statistically significant increase between scores. Overall PCP follow-up rate was considerably low. ED return visit was 13.8% at 30 days with a subsequent admission rate of 4.1%. *Conclusions:* Providing asthma education with an AAP at the time of ED discharge was effective in increasing caregiver education. Further, potentially collaborative, efforts may be required to increase PCP follow-up rate for asthma. Additional analysis will reveal whether ED visits for asthma can be reduced over the long-term.
5. 10:00       PROPOSAL FOR A CONGREGATIONAL HEALTH MINISTRY IN A CHURCH OF CHRIST. *Tameka Pritchett*, Samford University. According to *Healthy People 2020* (2014), one of the key priorities to promote health and wellness is to provide “access to comprehensive, quality health care services for the achievement of health equity and for increasing the quality of a healthy life for everyone” (Overview section, para.1). The United States Census Bureau (2014b) states that there were 42 million people in 2013 without health insurance coverage. The purpose of the project was to identify needs of one African American congregation for recommendation to implement a health ministry program. The Congregation Health Ministry survey consisted of 52 questions with 43 participant’s  $\geq 19$  years of age. Data was analyzed by a statistician using SPSS for the recommendation of the health ministry program. *Limitations:* Missing data; Participants not honest or gave incorrect information via survey; Majority of participants were females; and Self-reporting of height and weight. *Recommendation/Results:* The need for education on prevention, health maintenance, and access to health services was recommended. Discuss strategies to facilitate health promotion awareness. *Results:* HYPERTENSION- 48%, HEART DISEASE- 7%, DIABETES- 14%, CANCER- 9%.



6. 10:20 DIGITAL BREAST TOMOSYNTHESIS: OUT WITH THE OLD. IN WITH THE NEW. *Donna Cleveland*, University of South Alabama. Digital breast tomosynthesis (DBT) has rapidly emerged as an important new imaging tool that reduces the masking effect of overlapping fibroglandular tissue, thereby improving breast cancer detection. This paper will review the key features of DBT including technique, clinical implementation, and benign and malignant imaging findings. It will also present the benefits of DBT in screening, diagnostic workup, and image-guided biopsy.

Mammography screening can save lives because breast cancer is a progressive disease and early detection enables improved prognosis due to appropriate treatment of small nonpalpable node-negative cancers. Multiple randomized controlled trials and observational studies have shown that mammography can reduce breast cancer mortality by 30% or more [1–3]. Despite the success of mammography, overall sensitivity is limited by the presence of dense fibroglandular breast tissue, which can obscure an underlying cancer [4, 5]. Specificity is also reduced by the presence of overlapping fibroglandular tissue, which can mimic the appearance of cancer. Digital breast tomosynthesis (DBT) represents another significant advance in mammography technology, enabling multiple tomographic images to be obtained in any conventional mammographic view, creating a “semi-3D” mammogram. This enables visualization of a sequential stack of thin image “slices” of the breast, minimizing the masking effect of overlying tissue and enabling improved cancer detection while simultaneously reducing false-positive findings. Tomosynthesis images are acquired as the x-ray tube travels across a limited arc above the breast and multiple low-dose x-ray exposures are obtained. The motion of the tube, the length of the arc, and the time it takes to obtain a complete set of projection images—reconstructed into thin image slices spaced at 0.5–1.0 mm—are variable across different manufacturers. Specifications of tomosynthesis units are manufacturer dependent and currently, there are three FDA-approved tomosynthesis units. Objective: The Food and Drug Administration (FDA) first approved DBT in 2011, and multiple studies have shown that DBT is effective in both screening and diagnostic settings. This paper will review the DBT technique and address practical considerations regarding the implementation of DBT into clinical practice in the screening and diagnostic setting of breast intervention.

Conclusion: Breast Tomosynthesis improves interpretive performance and will likely replace conventional 2D mammography in clinical practice.

**\*\*u or \*\*g** Denotes presentation entered in student competition as an undergraduate or graduate student, respectively.

**SECTION IX: HEALTH SCIENCES**

**Poster Session**

**Thursday Morning**

***KCC Atrium and Ballroom Foyer***

**Authors Set-up: Begins at 7:30 AM**

**Authors Present: 11:00 AM - 12:00 Noon for Viewing and Judging**

**Ronald N. Hunsinger, Presiding**

8. **\*\*u ANIMAL-ASSISTED THERAPY RESEARCH FOR CHILDREN WITH AUTISM.** *Caitlin Perry*, Faulkner University. This case study focused on the addition of a therapy dog in a clinical therapy session that included children with Autism Spectrum Disorder. The purpose of this study was to determine how Animal Assisted Therapy may benefit and support Autism during a speech language session. The data collected were analyzed to gain an understanding of how the addition of a therapy dog could assist with children in successful speech, language, and behavior of students with ASD. Qualitative methods of research were also used to conduct this study through the use of observations, conducting therapy sessions with and without the therapy dog, in order to test the quality of the child's interactions and behavior during the session. The study focused on different children with autism spectrum disorders. Most that were studied had a behavior problem that caused difficulties throughout the therapy session. This study was conducted over the several months in late 2018. The goal of this study was to determine if the use of a therapy dog during a speech therapy session would increase interaction and good behavior of the patient.
  
9. **\*\*u RESPONSE OF ATHLETES TO TWO STRETCHING ROUTINES BEFORE EXERTION.** *Cody Parmer*, Faulkner University. In many sports stretching is an important part of warmup routines before workouts, practices and games. The purpose of this experiment was to determine if static stretching three times per week for one month would shorten timings of a "T-test" and a 40-yard dash run by male college athletes. All of the subjects jogged one lap around a football field and rested briefly before the first timed tests. The control group continued their normal exercising while experimental group added a prescribed month of weekly stretches for the hamstring group, the quadriceps group, the hip flexor group and the gluteus maximus. After the month both groups were again tested and the results were analyzed. The results of the analyses are presented in this report.
  
10. **\*\*u EVALUATION OF NURSE'S KNOWLEDGE AND CONFIDENCE IN ACUTE PSYCHIATRIC CARE.** *Chandler Jones*, Chrystal Lewis, and Sonia Smith, University of South Alabama. **BACKGROUND:** The number of patients with mental disorders is increasing, and for some patients, the only place to receive care is in the emergency room. The staff caring for these patients do not receive any additional workplace education or training on acute psychiatric care. **AIM:** The first aim of this study is to evaluate the knowledge and confidence of the emergency department nursing staff in caring for psychiatric patients. The second aim of

the study seeks to improve the knowledge of the emergency department nursing staff by providing education regarding acute psychiatric patient care.

**METHODS:** This quasi-experimental study utilizes a pretest and posttest questionnaire for data collection. The emergency department nurse's knowledge and confidence in acute psychiatric care will be examined with these questionnaires. A paired t-test will be used to determine if differences exist between data collected before education and data collected after education was implemented.

**RESULTS:** Data collection is currently in progress, results are pending.

**CONCLUSION:** Emergency department nurses would benefit from additional education on acute psychiatric care.

11. **\*\*u SKIN TO SKIN CONTACT IN THE SACRED HOUR OF NEONATAL LIFE.**

*Lauren Gardner, Leigh A. Minchew, and Chrystal L. Lewis, University of South Alabama.* **BACKGROUND:** The importance of implementing skin to skin contact within the first 60 minutes of extrauterine life is endorsed by the World Health Organization and JOGNN. Yet, skin to skin contact for the recommended 60 minutes is not consistently implemented in practice settings.

**AIM:** The aim of this research study was to 1) assess Labor and Delivery (L&D) nurses' knowledge of current skin to skin care policies and national guidelines at an academic health science center hospital 2) determine L&D nurses' perceived barriers to implementing skin to skin contact during the first hour of neonatal life in uncomplicated vaginal deliveries 3) determine L&D nurses' confidence in implementing skin to skin contact during the first hour of life.

**METHOD:** Nurses were provided a survey packet that contained: Demographic and Nurse Survey; Knowledge Questionnaire; and the *Modified Mother-Newborn Skin-to-Skin Contact Questionnaire* (Nahidi, 2014). The survey was collected and evaluated by the researcher. The results will be aggregated and shared with hospital leaders and Labor and Delivery nursing staff.

**RESULTS:** Data collection is currently in progress, results are pending.

**CONCLUSION:** Initial brief data analysis revealed an opportunity to expand knowledge of skin to skin contact, identified lack of maternal knowledge and staffing shortages as barriers to implementation, and demonstrated L & D nurses' felt very confident.

Therefore, L & D nurses feel supported with implementing skin to skin care.

**\*\*u or \*\*g** Denotes presentation entered in student competition as an undergraduate or graduate student, respectively.

# ABSTRACTS

## SECTION X. BIOETHICS AND HISTORY AND PHILOSOPHY OF SCIENCE

### SECTION X. BIOETHICS AND HISTORY & PHILOSOPHY OF SCIENCE

#### Paper Session I

Thursday Morning, *KHCC Ballroom A<sub>3</sub>*

Clark Lundell, Presiding

9:30 am – 12:00 pm

1. 9:30 am FEAR TO FAIL, FEAR TO SHARE: NEGATIVE EFFECTS OF SOCIAL MEDIA ON THE DESIGN STUDENT. *Benjamin Bush*, Auburn University. Social media is one of the most pervasive forms of media that the world has ever seen. In less than 8 years Instagram has grown to have over 1 billion users. In the United States, approximately one in three have an Instagram account. With unparalleled access to user created content, there are bound to be surprising effects. The United States creative industry had another landmark year last year adding \$764 billion to the economy. That's 4.2% of the GDP. And despite all of this success, artistic/creative education in secondary schools remains largely underfunded and underemphasized. Given this lack of priority, the responsibility of developing creative skills in young people is solely placed on the creative departments of higher education. Social media can deliver inspiration and give students access to a global network of peers and role models. It can also keep students up to date with the latest trends, movements, and emerging technologies. Unfortunately, access to this active, global community has also produced some unwanted outcomes. Outcomes like a lack of transparency, perceived judgement, and the weakening of 'delayed gratification'. Dieter Rams preached that good design is honest. A lack of context, process, and critique in online content has produced a certain kind of fear when students share their design work. This presentation will further identify issues generated by social media and propose approaches that can be used to deflect these issues in the creative classroom.
2. 9:45 am REFRAMING OPPORTUNITY IN RESEARCH. *Christopher Arnold*, Auburn University. Addressing questions surrounding the role of academic research involving design, Dr. Richard Buchanan published the body of a conference presentation entitled "Design Research and the New Learning" (Buchanan, 2001). In doing so, he articulated the character and origins of the chasm between disciplines rooted in fundamental research inquiry (e.g. the physical and human sciences) and the generative practice of design which he traces back to the scientific revolution of the Renaissance. Two decades later, Dr. Buchanan's thesis remains relevant and yet his argument has not advanced within the context of academic discourse. To the detriment of the academe, the gap in funding for and the low perceived value of research on design minimizes the humanistic worth

ascribed to a wide range of disciplines and limits the practical value of basic scientific research. To encourage discussion about research on design, this re-introduction to Dr. Buchanan's work will highlight opportunities for alignment with design disciplines that can spark a rebirth in learning within comprehensive academic institutions. By re-framing the differences between disciplines of design and the sciences, not as conflicting values but as complementary perspectives, the strengths of each will lead to new opportunities for collaboration and understanding benefitting both.

Reference: Buchanan, R. (2001). Design Research and the New Learning. Design Issues, 17(4), 3–23. Retrieved from <http://www.mitpressjournals.org/toc/desi/17/4>

3. 10:00 am WHO'S AFRAID OF CRISPR BABIES? *James Bradley*, Auburn University. On November 26, 2018, Chinese researcher He Jiankui, announced birth of the world's first babies genetically edited by the powerful CRISPR technology. Ostensibly, the rationale for the work was to inactivate the CCR5 gene required for HIV entry into cells and to render the twin girls resistant to future infection with the AIDS virus. Gene analysis of the two embryos before implantation showed that only one had both copies of CCR5 disabled. The individual with just one copy disabled would remain unprotected from HIV infection. Analysis after birth showed genetic mosaicism in both babies, making it unlikely that either one is protected. An outcry from scientists and bioethicists condemning the work as unsafe and unethical ensued. He's work was certainly premature, but does his medical/scientific debacle argue against our choosing a future that includes CRISPR babies? How might the history of *in vitro* fertilization and the emergence of ATM machines give insight into our choice-making process regarding gene-editing the human germ line? Our attention ought to focus on the wise use of CRISPR gene-editing in humans rather than on preventing it.
  
4. 10:15 am DESIGNING FOR SUSTAINABILITY AND RESILIENCE. *Rusty Lay*, Auburn University. Technology, automation, and the many systems that have been put in place to add efficiency and convenience to our lives allows modern cultures to live prosperous and "easy" lives compared to most cultures throughout history. Our lives of ease have many desirable attributes but, we have simultaneously developed a high level of dependency and a lack of resilience in the face of many common challenges. A desire for a life of "prosperous ease" and the desire for convenience has ushered a systemic and often unrecognized dependency on fragile systems into modern cultures. Even when our systems run smoothly, our dependencies have been proven to be a risk to the planet's environment and resources, as well as to the maintenance of knowledge. When the systems fail, our dependencies are a risk to culture, economic stability, and to life itself. There appears to be either a growing understanding of the true nature of the risks we live under in our modern society and an unrecognized convergence of differing cultural movements. There is a handful of counter cultural rejections of particular areas of risk by a growing population taking the form of movements and sub-cultural trends. Through intentional and strategic design, a connection between these counter cultural movements could be fostered and a philosophical shift of our society could be nudged toward a life of resilience, independence, and greater humanness.

5. 10:30 am EXPERIENCING THE POWER OF PLACE. *Brian LaHaie*, University of Georgia; Clark Lundell, Auburn University. Life takes place. Clearly the two are inseparable. We experience our lives connected both physically and spiritually in place. The places we inhabit are expressions of their geo-physical locations and our collective experiences and memories. Spaces evolve into places over time. Equally, places can erode over time. In the best-selling book, “The Geography of Nowhere” James Kunsler suggests that we increasingly live in a placeless world. Due to our increased mobility, increased technology and decreased sensory awareness, we are losing our sense of place. This paper presentation will explore what makes landscape places memorable and meaningful and will demonstrate that good design responds to meaning and place.
  
6. 10:45 am FUNCTIONAL AESTHETICS. *Randall Bartlett*, Auburn University. Today, many consumers continue to purchase products according to appearance over functionality. So, in favor of the majority of consumers, the manufactures shape or reshape their products to attract sales. This is known as styling. Styling is reshaping a products form of appearance only, no functional change. Don't mistake, the appearance of a product, the aesthetics, is important, but often that is the only change and the product is marketed as a “new” model. Aesthetics can be achieved at the beginning of the design process, let me say it this way, aesthetics should be a natural attribute of the designer during the design process. Changing the image of a product may enhance sells works, but improving the products function to enhance the use is a greater value. To give the title “designer” to someone who solely changes the appearance of a product to enhance sells is not a designer, but a stylist. Industrial designers have been looked upon as a stylist. This is a misconception, even though some designers are required to become a stylist. Industrial design is having an appreciation and understanding of the importance of aesthetics in product design, but this is an intrinsic attribute of the industrial designer. The industrial designer must consider the aesthetics during the human, technical and production functions of the development process. Could there be a new phrase, a movement or teaching theory called “Functional Aesthetics?” This paper will explore that possibility.
  
7. 11:00 am TECHNOLOGY TENSIONS WITHIN VISUAL ARTS EDUCATION. *David Smith*, Auburn University. Research has shown that use of technology can enhance education, conversely there are those that say technology can displace important hand skills in early learning development. Education within the visual arts—and specifically graphic design also has a tension between tasks completed by hand versus tasks completed with technology. We know that technology is important to visual arts because art which utilizes digital technology in its creation has found a place in contemporary fine art, and graphic design as it is practiced today could not function without the computer. Some would even say that all graphic design is performed on the computer. Therefore, it is imperative that learning to work with technology is part of student course work. Acknowledging the importance of technology in design education is a given, but how much is too much? When does technology become a hindrance rather than a help? Is it possible that a curriculum too dependent on technology can hurt the quality of a creative visual education? This paper examines the tensions of working on paper versus working with digital technology in graphic design education. The reality is that digital tools are

not easier or faster for every task, and they certainly won't generate ideas on their own—they are just tools. The head directs the hand, and the hand directs the tool. Part of the tension between hand and digital is the tendency of students to skip developmental steps in the creative process when using digital tools.

8. 11: 15 am THE STRANGLEHOLD OF THE 1910 FLEXNER REPORT. *Kenneth Nusbaum*, Clark Lundell, Auburn University. Part of American Exceptionalism continues to be “fee-for-service” health care, a system that even physicians may not find amenable. From the inception of the Colonies, medical care was fee-for-service, and medical training was provided through apprenticeships or private, free-standing medical schools, and subsequently, by medical schools attached to accredited colleges and universities. Clearly, the products of such a system would be of uneven quality. The Flexner Report was released in 1910 as a critique and corrective of medical education in the US and Canada. The report led to the “professionalization” of medical education and resulted in the closure of many private medical schools, to include all medical colleges for women and permitting only Meharry and Howard to provide medical education for African Americans. The increased rigor of medical education greatly increased the quality and practice of medicine in the US and for at least 5 decades following the Report, medicine remained the lucrative province of white men, women were nurses, minorities were aides and scullions. Demands for medical care, demonstrated competence of non-physician health care providers, and lessons from the European model gradually weakened the stranglehold and edged the US toward alleviating the social injustice that emerged from Flexner’s report. Today, the format of American medical education extends deeply into those countries which provide health care workers to fill our physician gap.

## **SECTION X. BIOETHICS AND HISTORY & PHILOSOPHY OF SCIENCE**

### **Paper Session II**

**Thursday Afternoon, 1:00 – 3:30 pm**

***KHCC Ballroom A<sub>3</sub>***

**Clark Lundell, Presiding**

9. 1:00 pm \*\*g ALTERNATIVE AGRICULTURAL TECHNIQUES FOR DECREASING ENVIRONMENTAL DAMAGE. *Justin Murphy*, Auburn University. By the year 2050, it is predicted that food production must increase by 70% to feed the world’s increasing population. Unfortunately, using current agricultural techniques would require a proportional increase in practices that cause documented environmental damage and potentially devastating adverse health consequences for numerous biological life forms. As a result, environmentally friendly methods must be found that either match or exceed current agricultural practices. One environmentally friendly method for increasing crop yield is the use of sound waves to promote plant growth. This method uses acoustic technology to apply sound pressure and frequency levels to crops in an attempt to increase crop yield and nutrient density. This researcher proposes to combine the use of

acoustic technology to an environmentally friendly system that is showing great promise, aeorponics. Aeorponics is a system that uses a nutrient rich mist to grow plants in a controlled indoor environment, without the use of soil or an aggregate media. Research has demonstrated that aeroponic techniques decrease water use by 90%, reduce fertilizer need by 60%, eliminate the need for pesticides, and has an ability to increase yearly crop yields by up to 75%. I will be testing the effects of acoustic technology on various crops grown in a high-pressure aeroponic system built using guidelines reported by NASA. This experiment will test the hypothesis that exposing plants grown in a high-pressure aeroponic system to sound waves of appropriate pressure and frequency levels will increase plant growth and quality.

10. 1:15 pm \*\*u BOSS BABIES TAKING OVER THE MARKET: ARTFUL OBJECTS AT INFLUENTIAL TIMES. *Alexis Kennedy*, Auburn University. The elemental stages of life are full of momentous milestones characterized by artful objects. One of the most significant artful objects introduced to babies are their utensils. Learning to use a spoon and fork is a tedious task often accompanied by fighting to use their hands instead of fine tuning their motor skills. The design of infantile utensils become key in babies' developmental process. Over the span of five months, babies acquire the ability to see color. Suddenly the pastels are replaced by vibrant and saturated colors in order to maintain the baby's attention. Artful objects for youth are a complicated twofold field as the marketer must appeal to two contrasting consumers. The parents are catapulted into a new, colorful, and animated world which has little to no sentiment to them initially. The marketer is plagued with the difficult task of attracting the parents while still staying true to brand. Marketers often utilize the strategy of evoking fond memories of childhood through iconic cartoons; while still satisfying the infant's newfound crave for color. Thus, a marriage of color and emotion is then crafted onto tools such as spoons and forks. The vibrancy of the utensils increases the enjoyability of the task of maneuvering utensils, and act as a flashback to childhood for the parents.
11. 1:30 pm \*\*u BALL BEARING. *Josh Buchholz* and *Clark Lundell*, Auburn University. The ball bearing was invented in 1794 to reduce friction on spinning objects. Ball bearings are used in everyday items such as skateboard wheels, DVD players, washing machines, and fidget spinners. The ball bearing is an engineered object that it is not made to be seen and is only made for the function that it serves. It is designed to sit inside of a spinning object to make the movement smoother. Ball bearings are mesmerizing to watch because there is little friction that impacts the bearing. This means that it will spin for an extended period of time. Due to the fact that they are intriguing to watch Catherine Hettinger invented the fidget spinner which is a single ball bearing surrounded by three plastic arms. These spinners function by pinching the ball bearing and then flicking one of the arms. Fidget spinners are made to reduce anxiety and to help the users focus. While ball bearings are very effective they continue to evolve with improvements such as better lubrication. With lubrication, the life of the ball bearing is extended which will lead to less maintenance and a longer spin life. The main source of lubrication that ball bearing use is grease. Ball bearings started out to improve the function of tools and evolved over time to include objects of entertainment as well as useful items.



12. 1:45 pm \*\*u *UOMO UNIVERSALE*. *Jessica Elridge*, Auburn University. During the Renaissance a rebirth of ideals was brought about and one was the idea of the Greeks that well roundedness was essential. *Uomo Universale* was a person of the time who conquered knowledge in both art and science because the two go hand and hand. A designed product embodies this concept of art and engineering science intertwining. To design a product, functionality along with aesthetic appeal are taken into consideration. For instances kitchen ware is made from materials that are suitable to withstand high heats, cut through materials, and be durable. Kitchen ware also is made to have an attractive look. A sleek, appealing appearance attracts customers in collaboration with capabilities of an item. Looking good and operating effectively are the key components of anything being well-designed because it will be very marketable to the public. The unique job of bring together the artful and engineering world into one package is done by ensuring the product works properly and are not an eye sore in its intended environment. Packaging and presentation matter to a great extent in the production world. Buildings, cars, tool, gadgets, electronics are all designed objects. So, the Greeks and those of the Renaissance period had the right idea about the arts and the sciences being in harmony to design a new world.
13. 2:00 pm \*\*u *BALANCE IN OUR LIVES*. *Alexandra Byrd*, Auburn University. From the moment we are born until the moment we pass on, we have a deep desire for balance in our lives. Our brains are split by hemispheres, the right and left, which operate two distinctly different aspects of the human mind – both of which unite in control. The left brain seeks to find logical answers, allows us to speak, and controls the right side of our body; meanwhile, the right brain uses creativity, seeks to understand the abstract, and controls the left side of the body. These two opposing concepts – logic and abstract – work together to help each person achieve a cognitive balance and produce stability in everyday tasks. In a well-designed object, our minds look for and recognize the equilibrium of beauty and usefulness. Every day, our two hemispheres compromise and work together to make decisions. This combination of logical choices with gut instinct result in fantastic design collaborations for all kinds of objects: transportation, kitchen appliances, writing utensils, and more. For example, if someone was looking to buy a car, the engineered would be considered while the artful is, in the end, what inspires you to see yourself driving the car. No matter the situation, the result of any well-made decision stems from the efforts of both sides of the mind.
14. 2:15 pm \*\*u "DESIGN" A BEAUTIFULLY FUNCTIONAL COMPROMISE. *Jonathan Funk*, Auburn University. Design is comprehensive; function requires precision and beauty requires art. Design is all-encompassing. The left and right brain join together in a bipartisan manner to satisfy scientific laws while simultaneously appealing to the emotion of the human beholder. Of note: design is a compromise, not a confrontation. Function and beauty are integral parts of design; without either it ceases to exist. Just as left and right hemispheres are joined by the corpus collosum, design facilitates communication between the technical and the abstract. An example of a designed object with particularly strong roots in functionality and beauty is a watch. Watches appear to represent the epitome of rationality. Their function is to tell time down to the hour, minute and second. Mechanical innerworkings are expressed by the ticking and tocking

of gears and hands. Without watches, time is devalued. Without time, chaos erupts. Watches maintain order and ensure efficiency down to the second. And yet, a watch is not purely functional. Considerable time and money have been spent perfecting watch design. The face should be legible, but not too big. The band should be sturdy, but not too wide. Analog or digital? Traditional or smart? The answers to questions such as these are subjective. When selecting a watch to be worn daily, beauty is important. It should be comfortable and attractive. It should accomplish its purpose with minimal disruption to everyday activities. Designed objects are beautifully functional compromises, uniting precision and art in a way that engages and evokes emotion.

15. 2:30 pm \*\*u THE POWER OF COLOR. *Logan Ellison*, Auburn University. "Color is determined by light and it's interaction with surfaces. Wavelengths are either absorbed or reflected, with our eyes perceiving these reflections in values of red, green, and blue. The first principles of a color theory emerged in 1435 through the writings of Leone Battista Alberti. They also showed up in the notebooks of Leonardo da Vinci in 1490. But it was Isaac Newton who categorized this in 1704 through his color wheel. This recognizes that all colors are a combination of three primary colors; red, blue, and yellow. Mixing these will form secondary colors, with further mixing yielding tertiary colors. Colors can be split into the warm and cool temperatures, with the warm colors reminiscent of sunlight and the cool colors of water. Another important aspect of the color wheel is its arrangement in relation to color schemes. For instance, a combination of two opposite colors would be referred to as complimentary. On the other hand, a combination of colors located beside each other on the color wheel would be called analogous. All of this matters, because color harmony has a direct effect on our psychology. One study in 1996 even found that placebo pills using the warm color range were perceived as having a stimulant effect, with cool colors having a tranquilizing effect. Although a lot of this is determined by personal and cultural factors, our brains associate color with a visual experience. Therefore, our visual intake will affect our brains and bodies."
  
16. 2:45 pm CLIMATE: WAVES, TRAINS, SURFERS, SUNSPOTS, MINIMA, HISTORY, WARMING AND OCEAN CURRENTS. *Clark Lundell*, Auburn University. Objects radiating pulses of energy, measured over time, are visualized through sinusoidal waves. Ocean waves are pulses of energy which often cluster in wave trains of 14 individual waves. Waves and wave trains increase and decrease in the quantity of energy they carry. Surfers wait for the highest energy wave in a wave train, which can be 14 waves apart, to catch the awesome bomb wave. The sun emits solar wave pulses of energy manifested through the number of sunspots. The greater the sunspot activity in a solar wave, an 11-year time cycle, the higher energy emitted by the sun. Cycles are numbered. In 2018 we completed 11-year cycle # 24. Solar wave cycles are produced in trains which can contain 5 to 10 eleven-year solar cycles. In 2018 we completed a wave train of ten solar cycles that began in 1906 with cycle # 14. A high energy wave train (1906 to 2018 called a Grand Solar Maximum) is followed by a low energy train (2019 to 2120 called a Grand Solar Minima). Historically Grand Solar Minima are associated with cooler world temperatures which under current circumstances may minimally off set global warming trends. The real impact upon world temperatures may be atmospheric

warming and a solar minimum combining to alter ocean currents which drive the distribution of energy across the globe directly affecting world climate.

**SECTION X. BIOETHICS AND HISTORY & PHILOSOPHY OF SCIENCE**

**Poster Session**

**Thursday Afternoon**

***KHCC Atrium and Ballroom Boyer***

**Clark Lundell, Presiding**

17. 3:00 pm DISPROPORTIONATE EFFECTS OF CLIMATE CHANGE ON POOR AND MINORITY POPULATIONS. *Shuntele Burns*, Alabama State University. The environmental effects of climate change pose increased threats to health, safety, and economic security. Although climate change affects the entire planet and its inhabitants, it has a disproportionately adverse impact on poor and minority populations. In the U.S., low-income and minority populations are more likely to be exposed to higher levels of air pollution, and climate change will further worsen air quality. They are also more likely to reside in urban areas with less plant life to moderate heat and more buildings and pavement to hold heat. Thus, these populations are often more susceptible to respiratory and heat-related illnesses. Severe weather episodes and other conditions caused by climate change may decrease employment prospects in areas like tourism and agriculture, which engage significant numbers of low-income and minority workers. Globally, health issues triggered or exacerbated by climate change are more apt to occur in poor populations in tropical environments. Poor countries are also at a greater disadvantage from climate change because their economies depend principally on agriculture, which is vulnerable to weather mutability and extremes. In addition, primary crops like rice and wheat, staples in many low-income countries, are becoming less nutritious because of increased levels of CO<sub>2</sub>. Climate change is a global crisis with grave implications for the future of the planet. Solutions to this crisis should include a consideration of the moral and ethical issues surrounding it—issues related to social, economic, and environmental justice.

**MINUTES OF THE  
ALABAMA ACADEMY OF SCIENCE  
Executive Committee Meeting  
Kellogg Hotel and Conference Center  
Tuskegee University  
March 20, 2019**

Meeting was called to order at 7:10 p.m. by Drew Hataway. [Minutes on the Academy Website]

Attendees:

Ron Hunsinger  
Brad Bennett  
Brian Burnes  
Brian Lahaie  
Clark Lundell  
Richard Hudiburg  
Jim Bradley  
Matthew Edwards  
Wayne McCain  
P.C. Sharma  
Ayinde Chism  
Jack Shelley-Tremblay  
Ellen Buckner  
Akshaya Kumar  
Chritophers Stopera  
Cameron Gren  
Adriane Ludwick  
Ken Marion  
Mary Lou Ewald  
Mark Jones  
Malia Fincher

Jim Bradley moved to approve minutes. Ken Marion seconded. There was no discussion and no additions. Minutes were approved unanimously.

Comments or additions to the Spring 2019 reports were sought.

Ken Marion thanked the Board of Trustees for their service to the academy.

John (Jack) Shelley-Tremblay reported on the nominations process. He has been successful in contacting current office holders and new potential office holders via email. Drew Hataway recommended discussion of the slate of candidates. Wayne McCain moved to approve the slate as stated, and Mark Jones seconded the motion. The motion was approved unanimously.

The Bioethics section has recruited a record-breaking number of speakers for the spring 2019 meeting.

Meetings scheduled for A1 have been moved to C1, those in A2 have been moved to C2, and those in A3 have been moved to C3. Signs will be posted to advise attendees.

We have no host for the annual meeting in 2022 and are seeking for a host institution.

Drew Hataway clarified that Lawrence Davenport and Puneet Srivastava to receive Fellows of the AAS.

A correction needs to be made to the resolution for this year respecting the role of Dr. Prakash Sharma to “Prakash Sharma, Professor of Physics.” Jack Shelley-Tremblay moved to approve the resolution and Mark Jones seconded the motion. The motion passed unanimously.

Drew Hataway requests that sections try in the future to avoid scheduling judging and talks during the time when the photograph is taken.

Old Business:

**Update Action Items From  
Fall 2018 Executive Committee Meeting**

Action Item	Person Responsible	Due Date	Update 2/20/19
Send JAAS Issues to members with opt-in hardcopy instructions	Larry Krannich	Oct. 2018	Await JAAS issues. Will update in Fall 2019
Distinguished Service and Outstanding Leadership Award.	The Long-Range Planning Committee (Akshaya Kumar, Acting Chair)	Carried forward to Spring 2019	No progress has been made, so this item will be removed from the list of current action items.
Role of Graduate Students in AAS Governance**	Special topic for discussion raised by AAS member	Spring 2019	Cameron Gren submitted a proposed amendment to the constitution and bylaws (Agenda pages 34, 36, 43-4); will be voted on at the Spring 2019 AAS business meeting. A duration of the proposed terms may need to be added to the amendment under section 16, page 44 – add C. The individual shall serve for a two year non-renewable term. P.C. Sharma moved to approve the proposed change and Mark Jones seconded the motion. The motion was

			approved.
Develop a list of duties & responsibilities of associate editors.	Brian Toone	Spring 2019	Will address Fall 2019
Schedule a working meeting of editor, associate editors, and interested individuals for noon, Thursday, February 21, 2019.	Brian Toone	Spring 2019	Will move to Spring 2020
Distribute produced video to state school districts	Ellen Buckner	Fall 2018	Done
Post produced video on Academy website	Jack Shelley-Tremblay	Fall 2018	Jack Shelley-Tremblay has a candidate draft for a new AAS website and will share the link for preview in the next week, so that the executive committee can comment before the new website goes live.
Review and approve new AAS website	Jack Shelley-Tremblay	Fall 2019	
Distribute produced video to all Academy members	Ellen Buckner/Larry Krannich	Fall 2018	Done
Discussion of additional video development	Ellen Buckner	Fall 2019	Done
Discuss implementation of virtual Fall Exec. Committee meetings	Exec. Committee	Spring 2019	On Agenda, E-1 We will use WebEx. Participants need a computer with a camera and microphone or headset. Links will be sent out prior to the meeting via email.
Place "All presenters must be registered for the meeting." Statement on the Abstract/Title Submission site	Jack Shelley-Tremblay	Fall 2018	Done, also distributed via email
Update the By-Laws with Associate Executive Director guidelines	Larry Krannich	Fall 2018	Done, page 44, will be voted on in the business meeting Spring 2019. Cameron Gren moved to approve the changes to the bylaws as proposed. Mark Jones seconded the motion and the motion was approved.
Steering Committee needs to discuss and vote on the nomination of Jack Shelley Tremblay and other potential nominees for Associate Executive Director. Steering Committee will	Steering Committee	Fall 2019	

allow 1 month for additional nominations and will then vote by email.			
Update the By-Laws with amended Article IV, Section 1q approved at Fall 2018 Exec. Comm. meeting	Larry Krannich	Fall 2018	Done. Jack Shelley-Tremblay moved to approve the changes to the bylaws as proposed. Mark Jones seconded the motion and the motion was approved. This will be voted on in the business meeting Spring 2019.
Post updated By-Laws on Academy website	Larry Krannich & Jack Shelley-Tremblay	Fall 2018	Await Approval, D- Will be updated by Fall 2019
Develop a draft amendment to the By-Laws for a "graduate student at large" Executive Committee position	Cameron Gren	Spring 2019	Done. See above.
Discuss and formulate the roles and responsibilities of Section Chair/Vice-Chairs	Larry Krannich	Fall 2019	Needs to be posted on the website and sent to all section chairs and vice chairs. Section chairs should pass this document to newly elected vice chairs.
Discuss utility of Section V and VIII titles	Executive Committee and Section V and VIII chairs	Spring 2019	After a discussion of historical and current trends in these sections, Drew Hataway has charged the sections in question to discuss this issue at their section business meetings and, if necessary, return to the Executive Committee with a motion.

### New Business

1. Mark Jones moved to approve the proposed changes to Section 7 of the bylaws. Cameron Gren seconded the motion, which passed.
2. Matthew Edwards is planning for the 2020 AAS annual meeting in 2020 in Huntsville.
3. Drew Hataway raised the issue that the governor of Alabama recently announced plans to create a STEM advisory council (Advisory Council for excellence in STEM) but the AAS was not contacted. But Mary Lou Ewald is on the committee. Drew suggests that we send a request to the Public Policy Committee to draft a letter volunteering the AAS to play a role in the advisory council. Drew Hataway moved that we draft and present a letter to the governor. Ellen Buckner seconded the motion, which was approved.
4. Malia Fincher moved to adjourn. The motion was seconded by Drew Hataway. The meeting adjourned at 8:45.

Action Items for Fall 2019:

Action Item	Person Responsible	Due Date
Send JAAS Issues to members with opt-in hardcopy instructions	Larry Krannich	Fall 2019
Develop a list of duties & responsibilities of associate editors.	Brian Toone	Fall 2019
Schedule a working meeting of editor, associate editors, and interested individuals for noon, Thursday, February 21, 2019.	Brian Toone	Spring 2020
Review and approve new AAS website	Jack Shelley-Tremblay, Executive Committee	Fall 2019
Steering Committee needs to discuss and vote on the nomination of Jack Shelley Tremblay and other potential nominees for Associate Executive Director. Steering Committee will allow 1 month for additional nominations and will then vote by email.	Steering Committee	Fall 2019
Post updated By-Laws on Academy website	Larry Krannich & Jack Shelley-Tremblay	Fall 2019
Post and distribute the new documents describing the roles and responsibilities of Section Chair/Vice-Chairs, via email and website	Larry Krannich	Fall 2019
Draft a letter to Governor Kay Ivey to volunteer AAS to serve on the Advisory Council for excellence in STEM. The letter will be circulated electronically to the executive committee for editing and approval.	Science, Public Policy, and Public Relations Committee	Spring 2019



# Alabama Academy of Science Journal

## Scope of the Journal:

The Alabama Academy of Science publishes significant, innovative research of interest to a wide audience of scientists in all areas. Papers should have a broad appeal, and particularly welcome will be studies that break new ground or advance our scientific understanding.

## Information for the Authors:

- Manuscript layout should follow the specific guidelines of the journal.
- The authors are encouraged to contact the editor (E-mail: [brtoone@samford.edu](mailto:brtoone@samford.edu)) prior to paper submission to obtain the guidelines for the author.
- At least one author must be a member of the *Alabama Academy of Science* (except for Special Papers).
- The author(s) should provide the names and addresses of at least two potential reviewers.
- Assemble the manuscript in the following order: Title Page, Abstract Page, Text, Brief acknowledgments (if needed), Literature Cited, Figure Legends, Tables, Figures.

## Review Procedure and Policy:

Manuscripts will be reviewed by experts in the research area. Manuscripts receiving favorable reviews will be tentatively accepted. Copies of the reviewers' comments (and reviewer-annotated files of the manuscript, if any) will be returned to the correspondent author for any necessary revisions. The final revision and electronic copy are then submitted to the *Alabama Academy of Science Journal* Editor. The author is required to pay \$100 for partial coverage of printing costs of the article.