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Cover Photograph: Samford University's College of Health Sciences hosted the 95th annual meeting proudly showing off their new building on the east side of campus. This pond and walking trail are nestled in between the building, Lakeshore Drive, and Shades Mountain. Read more about the College of Health Sciences here: https://www.samford.edu/healthsciences/

Photo is courtesy of: Dr. Brian R. Toone, Samford University, who took this photo in early spring after the meeting.

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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The 95th Annual Academy of Science Meeting
Samford University
Birmingham, AL
March 14th-16th, 2018

BIOLOGICAL SCIENCES PAPER ABSTRACTS

SEVERE DROUGHT MAY ENHANCE OAK REPRODUCTION THROUGH EFFECTS ON ACORN WEEVIL POPULATIONS. *MALIA FINCHER*, ASHTON EDWARDS, MARISA GARRETT AND WESLEY WALTERS, SAMFORD UNIVERSITY.

Oak trees exhibit a reproductive behavior known as masting, in which they produce a large quantity of seeds in some years, interspersed with a periods of almost no seed production. This helps to conserve resources and combats against acorn predators, such as the acorn weevil. One popular hypothesis is the resource matching hypothesis, which states that masting is simply a version of all plants' ability to adapt to the abundance of resources, or lack thereof, in their environment (Perez-Ramos et. al 2010). This process can also be driven by environmental stress factors, such as drought. In summer-fall 2016, Alabama experienced a severe drought. It's probable that this drought could have inspired a subsequent stress masting event of Alabama's oak trees, in 2017. Simultaneously, very dry conditions in the leaflitter for pupating acorn weevils, which are important oak seed predators, may have decreased weevil populations in the year after the drought. We collected data from six cooccurring oak species at six sites in the Birmingham area and showed that weevil infestation rates of acorns were very low across all species. Since the frequency and severity of extreme drought events in the southeastern United States is expected to increase under most climate change models, this may actually benefit oak reproduction through suppression of acorn weevil populations.

PROTEIN AND LIPID PREFERENCES IN LYTECHINUS VARIEGATUS. *JACKSYN CLANTON*, UNIVERSITY OF ALABAMA AT BIRMINGHAM. BEN MCCAFFERTY,MARLEE HAYES,YUAN YUAN AND STEPHEN WATTS, UAB.

The sea urchin, *Lytechinus variegatus*, is an opportunistic omnivore that is innervated solely by a neural net. The urchin lacks a central brain, but we hypothesize that it prefers and targets specific quantities and qualities of both protein and lipid in its diet. In this study, 11 protein diets from various sources were prepared using an agar-based food cube. Each diet contained 1.5% agar, 10% of the respective pure protein source, and 32ppt of saltwater. Feed intake was found to be dependent on protein source. Feed intake was weakly correlated with the presence

of higher essential and branched amino acids. These data suggest L. variegatus is able to qualitatively assess a protein source, presumably based on amino acid content. In addition, 10 additional agar-based diets with different lipid sources were provided using 2% agar, 2% of the respective lipid, and 32ppt of saltwater. Compared to a control diet (fish meal protein source), the experimental diets containing only lipids were consumed less, with phospholipids promoting the highest feed intake. These data along with previous studies suggest L. variegatus prefers food containing primarily protein and carbohydrate over lipid.

A CALL FOR SCIENCE EDUCATORS TO DISH OUT THE ART. *SARAH ADKINS*, RACHEL ROCK AND JEFFREY MORRIS, UNIVERSITY OF ALABAMA AT BIRMINGHAM.

Over 40% of American students who begin four to six-year degrees in Science, Technology, Engineering, or Math (STEM) fields do not graduate with those degrees. This is due in part to STEM education, especially in the laboratory classroom, often falling short in representing the true exploratory nature of these fields. Many evidence-based efforts, such as Course-Based Undergraduate Experiences (CUREs) attempt to bridge this gap. CUREs allow students to engage in authentic research that is of interest to communities beyond the classroom walls.

We reformed a semester-long traditional cookbook microbiology lab to a CURE which uniquely uses art - in the form of agar art - as a platform for scientific inquiry. Microbiology students paint personalized works of living agar art from environmental soil isolates. Students then use standard microbiology techniques to identify their isolates, self-generate hypothesis, and execute experiments based off observations they make from their agar art; mirroring the type of critical thinking which drives authentic scientific inquiry.

Using the Persistence in the Science questionnaire instrument developed by Hanauer et al. (2016), we found that 33 students in the agar-art CURE were significantly more likely than a similar control cohort of 15 microbiology students to affirm attitudes associated with retention in STEM. We discuss the implications of our study for education reform, and suggest future directions for the use of art in STEM education.

SINGLE CELL PROTEINS PROMOTE WEIGHT GAIN IN CULTURED SHRIMP. *SOPHIE BRU*, YUAN YUAN, KAREN JENSEN, ROBERT BARRY, MICKIE POWELL, ADDISON LAWRENCE AND STEPHEN WATTS, UNIVERSITY OF ALABAMA AT BIRMINGHAM.

Fish meal is a high-quality protein source for fish and shrimp feeds. World fisheries for fishmeal are at maximum sustainable yield and alternative protein sources are needed as both demand and price increase. Single cell proteins (SCP) have been identified as potential replacement ingredients for fish meal protein. This study reports a bacterial (MRD-Pro) and yeast based (DY-Pro) SCPs (from Meridian Biotech) as a fish meal protein (FP) replacement. Control diet using a commercial formulation contained 21.4% FP. Three experimental diets contained 6.9% DY-Pro and 15.3% FM, 6.9% MRD-Pro and 14.2% FM and 16.3% MRD-Pro and 4.35% FM with SCPs replacing FM on a protein equivalent basis. Groups of 20 shrimp (ca. 7 g) were stocked into separate tanks and tanks were assigned randomly into each

treatment (n=3 tanks/diet treatment). Shrimp were fed an ad libitum ration and were weighed at the end of 38 days to quantify growth and feeding outcomes. Shrimp fed diets with MRD-Pro trended higher in weekly weight gain (2.6-2.9 g/week) than shrimp fed the FP control diet (2.4 g/week). Those fed DY-Pro showed weight gain equal to fish meal. Food conversion ratio trended lower in those fed MRD-Pro (2.18) compared to FP (2.52) and was equal to FP in those fed DY-Pro. These data indicate that SCPs can replace at least part of a quality FP in intensive culture.

FEED INTAKE AS AN ESTIMATION OF ATTRACTABILITY IN SHRIMP. *YUAN YUAN*, SOPHIE BRU, KAREN JENSEN, ROBERT BARRY, ADELE FOWLER, ROBERT MAKOWSKY AND MICKIE POWELL, UNIVERSITY OF ALABAMA AT BIRMINGHAM.

Immediate consumption of feed is important in commercial aquaculture, and leads to increased feed conversion and growth, reduced feed waste, reduced leaching of important and expensive nutrients, and improved water quality. We are testing single cell proteins (SCP) as protein sources for shrimp feeds. These include a bacterial SCP (MRD-Pro) and a yeast SCP (DY-Pro) provided by Meridian Technologies. Fish meal protein (FP) was replaced in part with two commercial SCPs and fed to the shrimp, *Litopenaeus vannamei*. These diets included a FP control diet containing no SCPs and three experimental diets with different levels of the two SCPs replacing FP. Groups of twenty shrimp were stocked into separate glass tanks in a recirculating aquaculture system. Tanks were assigned randomly into one of four treatments with three tanks/treatment. Forty feed pellets (ca. 1 g) were deposited into each tank at 9:00 am and 1:30 pm each day for three days. Pellets remaining in each tank were counted at three minute intervals for twenty-four minutes. Feed intake was calculated based on feed pellets remaining in the tank at each time point. Probability of consumption was determined by Cox Regression Analysis. Diets containing 6.9% DY-Pro or 6.9% MRD-Pro had significantly greater probability of 11.5% and 16.3%, respectively, of being consumed than the FP control diet. Diet containing 16.3% MRD-Pro had a significantly greater probability of 31.2% of being consumed than the FP control diet. These data indicate that SCPs enhance feed intake compared to FP and are effective attractants in shrimp diets.

VARIATIONS IN PATTERNS OF FEED INTAKE IN A SEA URCHIN. *MARLEE HAYES*, ROBERT MAKOWSKY, JESSICA M. HOFFMAN AND STEPHEN A. WATTS, UNIVERSITY OF ALABAMA AT BIRMINGHAM. JOHN M. LAWRENCE, UNIVERSITY OF SOUTH FLORIDA.

In sea urchins, feed intake is presumed to proceed until one or more requirements are met and satiation occurs. Feed intake targets may be a regulated on a daily basis, but mechanism(s) and plasticity of response that regulates food intake is unclear. Adult *L. variegatus* (25-35mm) were fed to excess an agar-based formulated diet that varied in both food and nutrient density. Each day for 11 days, agar cubes containing a formulated diet were weighed and placed in mesh cages housing a single individual. After 24 hours, each cube was removed, rinsed, blotted dry and weighed to determine the amount consumed daily per individual. Patterns and

variability in feed intake over the experimental period were analyzed. Within and between individual variation was demonstrated in sea urchin feeding, with within individual variation comprising a greater portion of the total variability. This would suggest that day to day variation in feed intake in a single individual contributes more variation overall than when comparing variation among multiple individuals. For most treatment groups day to day patterns of feed intake were not changing from beginning to end of the experimental period. However, certain treatment groups exhibited patterns of feed intake that increased over the experimental period. These same groups were predicted by Akaike Information Criterion (AIC) statistical analysis to be greatly impacted by an effect of time (day). This variability illustrates the complexity of the factors regulating feed intake and satiety in the sea urchin despite the lack of an organized brain structure.

SINGLE CELL PROTEINS AS FISH MEAL REPLACEMENT IN ZEBRAFISH DIETS. *STEPHEN WATTS*, UNIVERSITY OF ALABAMA AT BIRMINGHAM. ROBERT BARRY,SOPHIE BRU,YUAN YUAN,LAUREN FOWLER,MICKIE POWELL AND ADDISON LAWRENCE, UAB.

Quality fish meal products are found in all commercially-formulated diets for most fish species, including zebrafish. Fish meal can sometimes be replaced in part by other animal or plant proteins; however, results are mixed. We are currently examining single cell protein (SCP) as candidates for use in animal feeds. We have replaced fish meal hydrolysate (FPH) with a commercial source of SCP from bacteria (MRD-Pro) or yeast (DY-Pro) provided by Meridian Biotech. Five experimental diets were prepared, including a control which contained 25% fish protein hydrolysate (FPH) by weight (as fed). Additionally, MRD-Pro and DY-Pro each replaced 50 or 100% of the protein provided by the FPH. Zebrafish larvae were reared on live diets until day 35, and then fed experimental diets for the next 8 weeks. Zebrafish received a daily ration split into two feedings equal to 10% of wet body weight, adjusted every two weeks. Fish were randomly assigned to 2.8-L tanks (n=14 fish per tank, n=8 tanks per diet treatment) for 8 weeks. Survival was higher than 99% for each treatment. Fish in all diet treatments showed weight gain. In males, highest weight gain was seen in fish fed MRD-Pro (317 mg), followed by DY-Pro (287 mg) and the FPH control (278 mg). These data indicate that SCPs show great promise to replace all or part of a fish meal product on a protein equivalent replacement basis and require further evaluation in supporting health and reproduction as a complete fish meal replacement.

THE REGULATION OF AN INTRACELLULAR CA2+ SIGNAL IN MOLTING GLANDS OF THE BLUE CRAB, CALLINECTES SAPIDUS, AND ITS ROLE IN ECDYSTEROID PRODUCTION. *MEGAN ROEGNER* AND WATSON R. DOUGLAS, UNIVERSITY OF ALABAMA AT BIRMINGHAM. HSIANG-YIN CHEN, NATIONAL TAIWAN OCEAN UNIVERSITY. ROBERT ROER, UNC WILMINGTON.

In crustaceans, cycles of growth and molting are triggered by cholesterol-derived molting hormones (ecdysteroids) released from paired endocrine glands (the Y-organs) located in the

anterior cephalothorax. During much of the molting cycle, the levels of ecdysteroids in hemolymph are kept low by the action of a peptide molt-inhibiting hormone (MIH), produced in the eyestalks. While the removal of MIH suppression during pre-molt coincides with increased ecdysteroidogenesis, there is evidence that an additional positive stimulus in the form of an intracellular Ca2+ signal also plays a significant role. To better understand Ca2+ signaling in Y-organs, our lab investigated the proteins involved in regulation of intracellular Ca2+. We used a PCR-based cloning strategy (RT-PCR followed by 3'- and 5'-RACE) to clone a full-length cDNA encoding a putative sarco/endoplasmic reticulum Ca2+ ATPase (SERCA) protein from the Y-organs of the blue crab (*Callinectes sapidus*). SERCA transcript levels in Y-organs were then determined using quantitative PCR. Transcript abundance was assessed throughout a molting cycle, and compared to hemolymph ecdysteroid levels. The results are consistent with the hypothesis that stage-specific changes in SERCA expression occur in response to increased intracellular Ca2+, but are not a causative factor in promoting ecdysteroidogenesis. In order to identify the stimulus that drives the increase in intracellular Ca2+ we have pursued transcriptome analysis of C. sapidus Y-organs in search of differential gene expression patterns during times of high ecdysteroidogenesis. This work will elucidate the intracellular signaling pathways involved in increased ecdysteroid production and lead to a greater understanding of molting regulation.

URBAN TURTLE PROJECT. *ANDREW COLEMAN*, BIRMINGHAM AUDUBON SOCIETY.

Alabama is recognized as being home to the most species of turtles in the United States, mostly due to abundance of aquatic species. However, many of the state's waterways flow through urban areas, and development and habitat degradation can negatively impact many of these populations. The Urban Turtle Project will be initiated in May 2018 and will be a long-term study to document urban populations of turtles around the Birmingham metro area. The initial study period will occur over a 3-day period in May 2018. Numerous field sites along several urban waterways (Cahaba River, Shades Creek, Village Creek, Valley Creek, and Five Mile Creek) will be sampled. Sampling will be lead by experienced field scientists, who will be assisted by trained citizen scientists. A suite of morphological measurements will be collected from each captured turtle and each turtle will be tagged for future identification. These data will elucidate relative abundances of various aquatic species at these sites, and future data will enable questions to be answered regarding health, survival, longevity, etc. This project also serves as an important outreach tool. The public will be invited to several of the sites to view the field work being executed. Their presence along with the assistance from the citizen scientists will provide education opportunities about the Alabama's chelonian diversity and potential threats to their future survival.

INFLAMMATORY PAIN CAUSES MALE ZEBRAFISH TO SEEK COOLER WATER. *CHRIS TAYLOR*, UNIVERSITY OF ALABAMA AT BIRMINGHAM. WATTS STEPHEN AND SORGE ROBERT, UAB.

Previous studies in our lab suggest that the zebrafish *Danio rerio* is a good candidate as a high-throughput, inexpensive model for testing chronic pain treatments. However, reports that claim

zebrafish suffer and feel pain like mammalian models have been met with skepticism. Our data suggests that zebrafish exhibit dose dependent behavioral changes in response to nociceptive stimuli. These responses are also affected by sex and nutritional history. However, these behaviors could be indicative of an acute nociceptive reflex rather than pain and suffering. Behavioral responses which are prolonged beyond the initial stimulus and behaviors which are adopted to alleviate pain are evidence of suffering. In mammals inflammatory pain is exacerbated by increasing temperature and alleviated by decreasing temperature of the inflamed tissue. In this study zebrafish were injected in the lips with 5% acetic acid solution to initiate an inflammatory response. These zebrafish were then placed in a novel fish tank which maintained a consistent temperature gradient across its length. Male zebrafish positioned themselves in cooler temperatures when they were injected with acetic acid as opposed to the control. We suggest this behavior is a purposeful decision by the fish to alleviate its suffering. As zebrafish become more common in preclinical research laboratories, it is critical to examine means to reduce pain following acute procedures. It appears that a decrease in system water temperature following such a procedure will alleviate suffering from an inflammatory stimulus.

ARABIDOPSIS BAX INHIBITOR 1 (ATBI-1) INTERACTS WITH ATIRE1A TO EXECUTE PRO-SURVIVAL FUNCTION. *XIAOYU LIU* AND KAROLINA MUKHTAR, UNIVERSITY OF ALABAMA AT BIRMINGHAM.

The stress relief mechanism UPR can be initiated by ER stress sensor IRE1 upon the accumulation of misfolded or unfolded proteins. The output of UPR alleviates the ER stress; and if stress persists, cell will undergo cell death. However, the AtIRE1-dependent mechanisms that regulate bacterial-pathogen-triggered cell fate decision remains unclear. Here, we demonstrated that AtIRE1a interacts with a highly conserved cell death suppressor AtBI-1. The interaction of AtIRE1a and AtBI-1 appears to be tightly regulated by the phosphorylation status of two amino acids. The interaction of AtBI-1 with AtIRE1a directly promotes the AtIRE1a-dependent AtbZIP60 mRNA splicing in vitro. Our data also positions important roles of AtIRE1-AtbZIP60 and AtBI-1 in cell fate decision upon avirulent bacterial pathogen attack.

SING ANTIOXIDANT DRUG TEMPOL TO ENHANCE METABOLIC MODIFICATIONS OF GUT MICROBIOTA IN MICE. *DARNELLA COLE*, UNIVERSITY OF WEST ALABAMA. JINGWEI CAI,ROBERT NICHOLS AND DR. ANDREW PATTERSON, PENNSYLVANIA STATE UNIVERSITY.

Obesity rates have drastically increased in the past decade. About 72 million Americans are obese. Nonalcoholic fatty liver disease (NAFLD) is also a worldwide problem. NAFLD has been estimated to have affected 20 to 30 percent of people worldwide. This disease is directly related to obesity and excessive alcohol abuse. Tempol, an antioxidant drug, has been tested and demonstrated to prevent and decrease obesity in mice. Tempol prevents and decreases obesity in mice due to its ability to alter gut microbiota; the drug has also been tested and confirmed to kill the bacteria *lactobacillus*. Previous studies have not clearly determined

exactly what is the relationship between how the drug modulates weight loss in the gut microbiome of mice and why it is happening, in conjunction with how bacterium in the mice's body is bio-transforming the drug into other substances, which, as a result, glucuronide and glucoside conjugates of the drug are being produced when injected into the mice. This study focuses on bacteria as it predominates in the gut of animals/humans to examine and determine how and why these transformations are being made, in conjunction with, underlining the relationship of how tempol is killing bacteria in mice. An anaerobic chamber is used as fecal samples are being prepared. Cell activity and cell damage of the fecal samples is determined using Flow Cytometry. Metabolomics data will include two methods: analyzing the samples via Nuclear Magnetic Spectroscopy (NMR) and a Principal Component Analysis (PCA). An examination of findings shows that there are three primary metabolites found in mice, which are Bacterial Acetate, Bacterial Propionate, and Bacterial Butyrate. For each primary metabolite, results show that with the control, the metabolism capability was high but when given increased amounts of tempol, the metabolism capability decreased, therefore, fermentation capability of the metabolites were low. The negative control, pH4, had the lowest metabolic activity, due to it making the cells inactive. In conclusion, now that methods of Flow Cytometry and Metabolomics have been optimized and the physiology and metabolic orders of the bacteria are known; the next approach would be testing several drugs to figure out if the drug has a primary or secondary effect on the bacteria. A primary effect will mean that the drug is directly effecting the microbes. Secondary effects will be expected if no results show from the primary effects, meaning the drug effects the host (mice) and the mice does something to the bacteria.

BIOLOGICAL SCIENCES POSTER ABSTRACTS

PHYLOGENETIC AND MORPHOLOGICAL ANALYSES OF THE EVERGLADES PYGMY SUNFISH (ELASSOMA EVERGLADEI). *ABBY HAWKINS*, JOHN LARRIMORE, JOSEPH SAMMONS, MICHAEL SANDEL AND KAYLA FAST, UNIVERSITY OF WEST ALABAMA.

Pygmy sunfishes are a group of morphologically distinctive, but poorly understood freshwater fishes of the southeastern United States. We investigated the taxonomic divisions within the species *Elassoma evergladei* using phylogenetic and morphological data. *E. evergladei*, known as the Everglades pygmy sunfish is commonly found in the Everglades and Atlantic coastal plain habitats. Environmental changes have recently led to concern within the fish's range because of fluctuations in population density and habitat loss. Recent changes could be leading to hybridization patterns with *Elassoma zonatum*, a closely related species within its range of the Atlantic coastal plain. Furthermore, geographical isolation north of the Everglades may be a mechanism driving diversity. We have collected representatives of the Everglades Pygmy Sunfish from all major watersheds and physiographic provinces within the species range. Morphological data include the number of dorsal spines, dorsal fin rays, caudal fin rays, pectoral fin rays, lateral series scales, and head scales. In conjunction, we have constructed a phylogenetic tree using mitochondrial data. This novel phylogeny revealed two well-supported and geographically restricted clades (North Carolina and Alabama). Morphometric analyses revealed wide variation in body shape, but no significant differences among the three groups. Head scale count distinguished populations from Alabama and extreme west Florida from all other populations. Morphological and molecular data provide evidence for a monophyletic clade within the range of *E. evergladei*. We propose a new species of Pygmy Sunfish, which is geographically restricted to the Mobile and Perdido River drainages of southern Alabama and western Florida.

PROSPECTING FOR ACTINOBACTERIOPHAGE PRESENCE IN HUMAN BREAST MILK AND NEONATE CHYLE. *MITCHELL DISHAROON*, MICHAEL SANDEL AND KAYLA FAST, UNIVERSITY OF WEST ALABAMA.

Breast milk is composed of crucial bacteria that aid in the development of a newborn's immune system. These bacteria are the building blocks of their intestinal flora. Babies fed strictly breast milk are healthier than babies that are fed formula, but the mechanisms for this are unknown. We hypothesize that bacteriophages from the breast milk are altering the microbiome in the gut that is beneficial to the baby. To test this hypothesis, we designed PCR primers for bacteriophages that infect *Staphylococcus aureus*. The genus Staphylococcus is one of the main bacterial components of breast milk, but S. aureus is a known human pathogen and a likely target of symbiotic bacteriophages. Primer design required three steps; 1) we ran DNA sequences through Bioedit to find the conserved regions across five S. aureus genomes, 2) we used the Primer3 program to design primers using the conserved regions, and 3) we used BLAST to identify putative gene functions. We found four viable primer sets corresponding to

partial sequences of the dUTPase gene (x2), a repressor gene and a hypothetical gene with unknown function. We are using a custom PCR assay of S. aureus phage in milk and chyle. Bacteriophages recovered from this project could be used as a probiotic to prevent S. aureus infection in preterm neonates.

BIOINFORMATIC RESEARCH INTO PHAGE HOST SPECIFICITY. *RAKIM ALI*, KAYLA FAST AND MICHAEL SANDEL, UNIVERSITY OF WEST ALABAMA.

Bacteriophages are viruses that infect bacteria and are the most numerous biological entities on the planet, vastly outnumbering every form of life on earth. As pathogens of bacteria, bacteriophages are a driving force behind bacterial evolution, thus they are an extremely important part of our planet's ecosystem. In recent years, research into host-phage interaction has shed light on the mechanisms involved within phage infection and the phage lifecycle as a whole. However, there is still much that remains a mystery, such as the mechanisms responsible for host specificity among phages. I conducted an exploratory comparative genomics analysis of Actinobacteriophages to identify factors related to host specificity. Using *Gordonia* phages as a point of focus, a bioinformatic approach into host range specificity has uncovered a possible link between the Lysin A protein and host range. The Lysin A protein of *Gordonia* phages appear to be related through a known protein domain, the LGFP super family. This domain is known to alter interaction with mycolic acids, which are crucial for survival among members of *Gordonia* and closely related members of Corynebacteriales. Preliminary research points to the LGFP domain of Lysin A as a crucial piece in the puzzle responsible for host range specificity among bacteriophages.

IMPACTS OF SEVERE DROUGHT ON REMNANT MONTANE LONGLEAF PINE COMMUNITIES AT OAK MOUNTAIN STATE PARK. *MALIA FINCHER*, SAMFORD UNIVERSITY. EMILY REPAS, ELMIRA COLLEGE.

Longleaf pine is a fire dependent species that once dominated the forests of the southeastern portion of the United States. Frequent fires, both natural and manmade, maintain the longleaf pine community structure and composition, while fire suppression results in increasing dominance by hardwoods and other pine species in many areas. Stressful habitats and stress events, such as intense drought, may allow longleaf pine to persist and maintain dominance in fire suppressed communities. We examined ecological differences between ridge and foothill habitats within Oak Mountain State Park and how these differences affected the survival of remnant longleaf pines and competing hardwoods and other pine species, in the summer after the severe drought of 2016. Ecological factors included slope, soil depth, canopy cover/light availability, soil nutrient availability, and temperature. The impacts of stress, as measured by these ecological variables in the year following a severe drought, were determined by comparing the percent mortality of longleaf pine, other pine species, and hardwood species across habitats varying in measures of potential stress. We found that while environmental conditions vary between the ridge and foothills, with greater potential for stress on the ridge,

this does not correspond to mortality. Drivers of drought mortality may vary on a very fine spatial scale, reflecting the microclimate of individual trees.

CATALSE PRODUCTION AND FUTURE MUTAGENESIS OF V. FISCHERI. *JULIAN JACKSON*, RACHEL ROCK AND JEFFREY MORRIS, UNIVERSITY OF ALABAMA AT BIRMINGHAM.

Oxygen is an essential element that mainly comes from a micro alga in the ocean called *Prochlorococcus*. *Prochlorococcus* is responsible for producing over 70% of the oxygen that we breathe in every day, but it is also is dying off due to the excess carbon emission that exist in our air. Excess carbon that is responsible for climate change also causes oxidative damage to *Prochlorococcus*. Oxidative damage occurs when alga cannot protect itself because it lacks the enzyme catalase which causes the reduction of hydrogen peroxide, the main culprit of cause of oxidative damage. *Vibrio* fischeri is a species of symbiotic bacteria that help protect *Prochlorococcus* by producing catalase. These bacteria are virulent pathogens that live within the Bobtail Squid but also processes the ability to produce catalase both intracellularly and extracellularly. Former explorations suggested that this pathogen could only be produced intracellularly, but current research challenges this notion. In our experiments, four strains of *Vibrio* were grown in a medium and centrifuged. The supernatant was then filtered to make sure no other nutrients could be in the media. Hydrogen Peroxide was added to the supernatant and bubbles were formed proving that *Vibrio* could excrete catalase extracellularly. If a mutant gene could be found through mutagenesis, then there is a bright future for *Prochlorococcus*, as it would no longer have to depend on symbionts to protect itself from hydrogen peroxide, and in turn provide the environment more oxygen.

ISOLATION, PURIFICATION, MODELING, AND BINDING SITE ANALYSIS OF THE SALMONELLA BACTERIOPHAGE ε34 REPRESSOR FOR SUBSEQUENT CRYSTALLIZATION AND STRUCTURE-FUNCTION STUDIES. *RICHARDRIA GOODSON*, DOBA JACKSON, MILAN BRANCH, MEAGAN CLAUSELL AND LOGAN GILDEA, HUNTINGDON COLLEGE. ROBERT VILLAFANE, ALABAMA STATE UNIVERSITY.

The bacteriophage ε34 is one of many phages that infect the bacteria *Salmonella* which is the main cause of salmonellosis (food poisoning). The bacteriophage ε34 encodes a protein called the cI repressor that is like other phage repressors. It has a C-terminal protease domain which is about 80% identical to the repressors of phage λ (which infects *E. coli*), but its DNA binding N-terminal portion is only about 50% identical to its closest known relatives in phages λ, and Lex A. This means that the ε34 repressor may have the same pathway for inactivation as phage λ, but probably has a different operator binding specificity due to lower sequence homology of its DNA-binding domain. The N-terminal DNA-binding domain is homologous to the Helix-Turn-Helix family of DNA-binding domains.

The main goal of this project was to initiate a structure-function study on the repressor protein of phage ε34. The ε34 Bacteriophage DNA was first isolated and purified. The gene encoding the bacteriophage ε34 repressor was amplified by PCR and cloned into a pET11a vector. The cI repressor, was overexpressed and purified by immobilized metal affinity chromatography and ion exchange chromatography. We also generated a homology model of this protein using the bacteriophage λ as a template in the SWISS-MODEL homology modelling server. Our models predict a unique structure for the N-terminal Helix-Turn-Helix domain. Finally, we have identified several potential binding sites upstream of the cI gene on the Bacteriophage λ DNA. We will present new models for the binding modes for the cI repressor/DNA complex. Crystallization trials are currently in progress. This project was done as a collaborative venture between two laboratories, Huntingdon College (Dr. Doba Jackson) and Alabama State University (laboratory of Dr. Robert Villafane). This project is in line with Dr. Robert Villafane's research into the Genomic analysis of bacteriophage ε34 of *Salmonella* enteric serovar Anatum.

DIETARY SATURATED FAT SOURCE DIFFERENTIALLY AFFECTS WEIGHT GAIN IN ZEBRAFISH. *AUDREY D. POWERS*, L. ADELE FOWLER, R. JEFF BARRY, MICHAEL B. WILLIAMS, LOUIS A. D'ABRAMO AND STEPHEN A. WATTS, UNIVERSITY OF ALABAMA AT BIRMINGHAM.

Current guidelines for saturated fat intake lack the support of conclusive research; therefore, the effects of saturated fat on human health remain controversial. Defining the effects of specific saturated fat sources will help establish more accurate nutritional guidelines. Zebrafish share many of the same pathophysiological pathways as humans and have been established as a powerful model for lipid metabolism studies to provide insights into the effects of dietary lipid on adiposity and nutrient allocation. The goal of the present study was to assess the effects of three different saturated fat sources (milk fat, palm oil, and coconut oil) on weight gain and growth in adult zebrafish. Each saturated fat source had one low- and two high-fat diets. A low fat and high fat reference diet were also included in the study as control diets, resulting in 11 total treatments. Zebrafish larvae were raised on live feeds until 28 days, and then fed a maintenance diet until they reached 3 months of age. Zebrafish were then fed the experimental diets for an eight-week period. At the termination of the experimental phase, each treatment was evaluated based on body weight and length. For all saturated fats the largest fish were found in those fed low fat diets (and highest protein: energy rations). Smallest fish were found in those fed the high fat coconut oil diets. We hypothesized that sources of saturated fat affect nutrient allocation. Our data support this hypothesis and indicate that current nutritional guidelines should be re-evaluated.

RARE EARTH METAL OXIDES: SYNTHESIS, CHARACTERIZATION, AND ANTIMICROBIAL ACTIVITY. *AFEF JANEN*, MOHAN AGGARWAL AND KADIATOU KEITA, ALABAMA A&M UNIVERSITY.

KUZHIVELIL JOSEPH ARUN, SREE KERALA VARMA COLLEGE, INDIA.

In this work, we report the synthesis of silver oxide (AgO), lanthanum oxide (LaO), samarium oxide (SmO), and neodymium oxide (NdO) nanoparticles that was carried out by the hydrothermal method. The prepared nanoparticles were characterized using X-ray diffraction (XRD), scanning electron microscopy (SEM), energy dispersive X-ray spectroscopy (EDS), transmission electron microscopy (TEM), Fourier transform infrared spectroscopy (FTIR), and ultraviolet visible spectroscopy (UV-vis spectroscopy). XRD analyses confirmed the crystalline structure and size distribution of SmO nanoparticles and their average particle size was 15.16 nm, LaO nanoparticles results were 30-40 nm in width and 150-200 nm in length, and NdO nanoparticles average size was 30 nm. In addition, the bioactivity of AgO, LaO, SmO, and NdO nanoparticles was assessed against *Escherichia coli* and *Pseudomonas aeruginosa* (Gram-negative organisms); *Streptococcus pyogenes*, *Listeria monocytogenes*, and *Bacillus subtilis* (Gram-positive organisms), and *Candida albicans* by using Bioscreen C which is a Growth Curve Analyzer. The results showed that at concentrations of 10 and 25 µl, AgO nanoparticles had the highest inhibiting effect on *Pseudomonas aeruginosa*, *Listeria monocytogenes*, and *Candida albicans* compared to LaO, SmO, and NdO nanoparticles. At 25 µl, LaO nanoparticles had a higher antibacterial effect on Listeria and at 10 µl on Pseudomonas and Candida compared to SmO, and NdO nanoparticles. Therefore, our results suggest that these nanoparticles have antimicrobial effects.

A RAPID METHOD FOR THE IDENTIFICATION OF ALABAMA CUSCUTA USING PCR-RFLP. *DAVID JOHNSON*, SAMFORD UNIVERSITY. JAVIER CARRILLO-CORTEZ, HUMBOLDT STATE UNIVERSITY.

Members of the genus *Cuscuta* are parasitic plants that feed on host plants, limiting growth and lifespan. Individual species identification of *Cuscuta* is difficult. The aim of our project was to develop a rapid method for identifying the species of *Cuscuta* found in North-Central Alabama using the polymerase chain (PCR) and restriction fragment length polymorphisms (RFLP). We developed a protocol using the a trnL/trnF primer sets followed by Mbol1 restriction enzyme digestion.

EFFECTS OF CHEMICAL DISPERSANT (COREXIT 9500A) ON THE STRUCTURE 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. Preliminary 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 Ca2+ transport proteins, plasma membrane Ca2+ ATPase (PMCA) and sarco/endoplasmic reticulum Ca2+ 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 significantly impacts the structure and ion transport function of gill tissue.

Research supported by the BP/Gulf of Mexico Research Initiative.

THE EFFECT OF α2A ADRENERGIC RECEPTOR ON ALZHEIMER'S DISEASE (AD) PATHOLOGY IN AN AD MOUSE MODEL.

***ITZEL MENDOZA*, SAMFORD UNIVERSITY. MARY GANNON AND QIN WANG, DEPARTMENT OF CELL, DEVELOPMENTAL, & INTEGRATIVE BIOLOGY. YIN PING AND KAI JIAO, DEPARTMENT OF GENETICS. UZMA NUR, SUMMER SCIENCE INSTITUTE: STUDENT RESEARCH INTERNSHIP PROGRAM.**

Alzheimer's Disease (AD) is a neurological disease that affects the patient's motor skills and cognitive functions. Unfortunately, AD cannot be prevented, cured, or slowed. Two neuropathological hallmarks of AD are excess deposition of amyloid β (Aβ) peptides, generated from the processing of amyloid precursor protein (APP), and hyperphosphorylation of the tau protein, which creates tau tangles. Research from our lab has shown that activation of the α2A adrenergic receptor (α2AAR) promotes β-secretase cleavage of APP, thus increasing Aβ generation. Further, we have found that blocking the α2AAR improves several of AD's cognitive symptoms and decreases Aβ plaque load in the brain of AD model mice. In this study, treatment of AD mice with idazoxan, an antagonist of the α2AAR, even when begun after profound Aβ plaque load, improved AD pathology and reduced APP plaque load. In conclusion, idazoxan is able to reduce AD pathology in an AD mouse model, even when treatment is not begun until after AD pathology is already present in the mice.

GONAD GROWTH IN SEA URCHIN LYTECHINUS VARIEGATUS EXPOSED TO VIBRIO NATRIEGENS. *AMY SEYMOUR* AND UDUAK AFANGIDEH, FAULKNER UNIVERSITY.

A four-week rearing trial was carried out on the sea urchin species *Lytechinus variegatus* in order to determine the relationship between microbes and nutrient uptake. *Lytechinus variegatus* is commonly known as the green or variegated sea urchin. This species can be found in the warm waters of the Western Atlantic Ocean. Although L. variegatus has no commercial importance, sea urchin gonads are known as a delicacy in Japan and other countries (Norris 2008). The gonads of various species of sea urchins are enjoyed in many parts of Europe, especially in France and southern Italy (Fabbrocini and D'Adamo 2010). The roles of various microbial taxa in both the digestive health of the host, as well as the ecological importance of those bacteria to the host's community has become a large focus in research (Hakim et al. 2015) with suggestions that microbial digestive support could potentially increase gonad size through nutrient uptake. The objective of this research was therefore to investigate the relationship between the microbial community and nutrient intake as it affects gonad growth in L. variegatus. The gram-negative marine bacterium *Vibrio natriegens* was administered to the experimental group and the effect on survival rate and gonad size were observed. Although the initial weight was directly correlated with the initial test diameters of the sea urchins ($r = 0.99$), the final weights and diameters were not highly correlated with a correlation coefficient of ($r = 0.37$). There was an increase in mortality rate and the various factors that contributed to the high mortality rate was also investigated.

SOUTHERN PORCINI: A PUTATIVE NEW VARIETY IN THE GENUS BOLETUS. *SAHAR DELGHANDI* AND JUAN L MATA, UNIVERSITY OF SOUTH ALABAMA.

Porcini is the name given to edible mushrooms in the genus *Boletus* whose type species is *B. edulis*. Besides their economic importance porcini are vital symbionts with plants. Porcini are distinctive in that they exhibit a tubed hymenium, instead of gills, with white pores becoming yellowish olive in age. Their stipes develop distinctive apical reticulations and their caps display a broad range of brown colors that don't change when cut. *B. variipes* is one of several look-alikes reported in the Southeastern United States that is most similar to specimens observed in the Gulf Coast of the United States. The goal of this study was to characterize and determine species identity of commonly found edible porcini in Mobile County which exhibit great variation in size, shape, and colors. Collections were first morphologically described. Results indicate we have *B. variipes* based on overall mushroom appearance but spore range is more akin to *B. atkinsonii*. DNA from 17 mushrooms was amplified to perform a restriction enzyme digest. Results indicate we have only one species. A handful of DNAs were selected for sequencing and blast-searching for matches in GenBank. Results suggest we have a taxon akin to *B. variipes* with only 85-92% identity based on the ITS region. In the phylogenetic tree our sequences come out as a distinct clade suggesting a unique and divergent variety among *B. edulis*, *B. variipes*, and other porcini. We recognize additional specimens from a broader geographical spectrum need to be collected and examined to corroborate our findings.

A PRELIMINARY INVESTIGATION OF THE VASCULAR FLORA OF GENEVA COUNTY, ALABAMA. *CAMERON BYRD* AND ALVIN DIAMOND, TROY UNIVERSITY.

A survey of the vascular flora of the Geneva County Alabama was undertaken in August 2016. Geneva County has an area of 1,500 km2 and lies in southeastern Alabama approximately 77 km north of the Gulf of Mexico. It lies entirely within the Dougherty Plain Ecoregion, and is drained by the Pea-Choctawhatchee River system. Major habitats found within the county include mesic hardwood forests, fire managed Longleaf Pine forests, farm land, river banks, ephemeral ponds and cypress swamps. As of the end of 2017, 648 species of vascular plants had been collected during this study. Two hundred twelve of these species (32.72%) had not been previously reported from Geneva County. Twenty-six species (4.01%) documented during the study appear on the Alabama Natural Heritage Program's list of rare, threatened, or endangered plants of Alabama. All voucher specimens will be deposited in the Troy University Herbarium (TROY), with duplicates to the University of West Alabama Herbarium (UWAL).

INVESTIGATING HISTONE DEACETYLATION DURING CHORION GENE AMPLIFICATION IN DROSOPHILA OOGENESIS. *ERIN BROWN* AND KRISTOPHER MCCONNELL, JUDSON COLLEGE.

During oogenesis of the fruit fly *Drosophila melanogaster*, the oocyte is surrounded by a population of somatic follicle cells, which are responsible for eggshell assembly. These follicle cells undergo characteristic transitions in the cell cycle during egg development. At oogenesis stage 10B, follicle cells exit the cell cycle and begin amplification, a process of DNA re-replication. Amplification serves to increase the copy number of the chorion genes, and is necessary for eggshell synthesis. The histones at the amplifying origins of DNA replication are hyperacetylated. This hyperacetylation is removed after amplification, prior to transcription of the chorion genes. Typically, histone acetylation is associated with active transcription of genes. Thus, removal of acetylation prior to transcription is unusual. We propose that acetylation is replaced with an additional activating histone modification. One candidate for this additional modification is crotonylation, which is also associated with active transcription. Here we use fluorescence microscopy to test for the presence of histone crotonylation at amplification origins. We further propose that if the removal of acetylation is necessary for chorion gene transcription, then a histone deacetylase (HDAC) must be required. We use Flp:FRT recombination to express dsRNA constructs against candidate HDACs in clonal patches of follicle cells, in order to knockdown these candidate HDACs by RNA interference. We then tested these clonal patches for disruptions in acetylation and amplification. Studying this developmental transition can provide key insights into the regulation of DNA replication – an important cellular process often at the center of focus in cancer research.

EFFECTS OF HEAT SHOCK AND GAL4 ON DROSOPHILA OOGENESIS. *KATIE OWENS* AND KRISTOPHER MCCONNELL, JUDSON COLLEGE.

Oogenesis in the fruit fly *Drosophila melanogaster* is an ideal model for studying cellular processes such as DNA replication and cell death. Investigations into the molecular pathways involved in these processes have informed our understanding of cancer and the disruptions that lead to cancer. A common tool used by fruit fly geneticists is the *Gal4:UAS* system that allows researchers to express transgenes using the transcriptional activator Gal4. This tool is widely used because Gal4 generally has no detrimental effects on normal fruit fly biological processes. However, it has been shown that Gal4 expression disrupts oogenesis when combined with heat shock. These disruptions include increased cell death, altered patterns of DNA replication, and an inability to lay eggs. We set out to characterize the defects in Drosophila oogenesis by determining the extent and timing of each defect. In addition, we also used various transgenic constructs to express inhibitors of cell death in an attempt to rescue these defects.

MUSKOGEE MEDICINE: NATIVE PLANTS COMMONLY USED IN MUSKOGEE CEREMONIES AND HEALING. *ALVIN DIAMOND* AND ROBERT PULLEN, TROY UNIVERSITY.

Alabama is home to over 4,100 species of plants, many of which were used by indigenous peoples and early settlers for a variety of purposes. Ceremonial leaders and medical practitioners in the Muskogee/Creek Nation continue to use many of these same plants in the pursuit of community wholeness and individual healing. This report is based upon fieldwork with three Muskogee plant specialists and review of relevant literature that describes the medical practices of the contemporary Muskogee Heles Haya (Medicine Makers). It identifies 12 commonly used medicine plants, gives their Muskogee name and how they are used in ceremonies or in healing work. Plants were collected during fieldwork at the Tuckabatchee site, one of four mother towns of the Muscogee Creek Confederacy, and capital of the Upper Creeks. Voucher specimens were deposited in the Troy University Herbarium (TROY).

LIMNODRILUS SP. LIVING IN TOXIC HYDROGEN SULFIDE. *SHELBY LAUZON*, JUDSON COLLEGE. DAVID JOHNSON, SAMFORD UNIVERSITY.

Very few Annelid species 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 primers from other sulfur-rich environment annelids and the 16S rDNA to find these mechanisms. Our study will help inform how these mechanisms play a major role in the longevity of this organism.

DIFFERENCES IN FREQUENCY AND INTENSITY OF CANOPY DISTURBANCE ACROSS THE RANGE OF EASTERN HEMLOCK.

***ISAIAH BYRD*, UNIVERSITY OF WEST ALABAMA. CAROLYN COPENHEAVER, VIRGINIA TECH. KETIA SHUMAKER, THE UNIVERSITY OF WEST ALABAMA.**

Eastern hemlock (*Tsuga canadensis* (L.) Carriere) is a long-lived conifer in old-growth forests in eastern North America. This tree can be a valuable record of historical disturbance. In this study, tree-ring chronologies from eight eastern hemlock stands were used to determine differences in canopy disturbances using the radial-growth averaging criteria. We hypothesized that across the range of eastern hemlock, canopy disturbance would be similar in intensity and frequency. We rejected our hypothesis because this study showed a diversity of disturbance patterns across stands. This heterogeneity is likely due to extreme weather events, logging, insects or pathogens. Eastern hemlock is a foundational species that provides habitat for wildlife, aquatic species, and later successional plants and our results imply old-growth forests are highly diverse which makes conservation efforts difficult.

CHEMISTRY PAPER ABSTRACTS

SYNTHESIS, CHARACTERIZATION AND REACTIVITY STUDIES OF COPPER (II) AND NICKEL (II) COMPLEXES. *NIHARIKA BOTCHA*, UNIVERSITY OF ALABAMA IN HUNTSVILLE. NIRUPAMA SINGH, AMBIOPHARM INC. ANUSREE MUKHERJEE, THE UNIVERSITY OF ALABAMA IN HUNTSVILLE.

The constantly increasing demand for energy and fuel resources requires the development of new energy solutions that are more sustainable and address the need for energy efficiency and conservation. Coordination complexes of late transition metals bound by nitrogen rich ligands are very important because of their pivotal roles in catalytic applications. Tetradenatate ligands from the bispicen family with amine and pyridine functionalities (N2/Py2) have also received significant attention for their role in hydrocarbon oxidation with high selectivity. These ligands are also attractive candidates for designing homogeneous catalysts as ease of synthesis allows systematic investigation of structural-functional relationship of the catalysts. They efficiently catalyze most of the organic transformations occurs in living systems under mild conditions with nontoxic oxidants such as O2 or H2O2 to oxidize a wide range of molecules, usually in a very selective manner. Thus, we can take inspiration from these natural phenomenon's and attempt to develop new catalysts that will ideally oxidize a wide array of organic molecules using cheap and environmentally benign oxidants. In our group synthetic mononuclear copper (II) and nickel (II) metal containing model complexes were synthesized and characterized using different spectroscopic techniques.

IDENTIFICATION OF ODOROUS VOLATILE COMPOUNDS IN RECYCLED PLASTIC RESINS. *JON FULLER*, ZANE VICKERY AND SHAOYANG LIU, TROY UNIVERSITY. JASON COLLEY, UNIVERSITY OF GEORGIA. DAVID NORMAN, EMORY UNIVERSITY.

The process of recycling plastics into usable material is an important part of waste management and in particular the reduction of solid waste. Although recycled plastics provide a low-cost and environmentally friendly alternative material for many everyday objects, there are several factors that limit the desirability of recycled plastics. Most notably among these is the presence of undesirable odors which are caused by volatile organic compounds (VOCs) in much of the recycled material. In this work, headspace solid-phase microextraction (HS-SPME) coupled with the gas chromatography-mass spectrometry (GC-MS) method was used to analyze volatile compounds from recycled plastic resins with odors. The established analysis methods have proven to be sensitive and relatively comprehensive to volatile compounds from plastic resins. Retention index (RI) and mass spectra of suspected odor-causing compounds were acquired and compared to those from standards to identify the culprit compounds behind the odor of the plastic resin. Notable amounts of D-limonene, octanal and nonanal were found in the odorous resins. However, some other odorous compounds presenting in other recycled plastic samples, including 2-acetyl-1-pyrroline, 2-methylisoborneol, 2,4,6-Trichloroanisol, γ-nonalactone, γ-necalactone, patchouli alcohol, γ-dodecalactone and vanillin were not detected

in this work. This research is performed in an attempt to discover the relationship between the unpleasant odors of recycled resins and the specific volatile compounds they contain. By correctly identifying the specific VOCs that cause the unpleasant odors, further research may be undertaken to remove them or otherwise mitigate their odorous presence and thereby aid the plastic recycling industry in improving product quality.

THE PYROLYSIS OF BP TARBALLS. *AMBER SMITH*, JACKSONVILLE STATE UNIVERSITY.

We have used thermal pyrolysis to analyze oil residue in tarballs collected at Gulf Shores, Alabama, after the April 2010 BP disaster. The oil residue was extracted from tarballs with dichloromethane. On average, BP tarballs contained between 10-18% of a semi-solid mixture of high-molecular weight hydrocarbons, resins, and asphaltenes. Such mixtures cannot be analyzed using conventional GC methods. Therefore, approximately 100 mg of the residue was encapsulated in an evacuated Pyrex tube and pyrolyzed at 440 °C. In these conditions, oil residue is decomposed into hydrogen and saturated/unsaturated hydrocarbons. Each saturated hydrocarbon is formed together with several unsaturated compounds containing the same number of carbon atoms, such as decane and isomers of decene. During pyrolysis, mostly straight-chain alkanes are generated whereas both straight-chain and branched alkenes are obtained. The infrared spectra of tarball extracts show the presence of small amounts of hydroxyl groups indicating that the oxidative decomposition of the oil residue in marine environment is very slow.

OPTIMIZATION OF A TETRACHLOROETHYLENE-METHYL METHACRYLATE COPOLYMER SYSTEM UNDER PH7 BUFFER. *LOREN CHEATWOOD*, JUSTIN TINKER AND DONNA PERYGIN, JACKSONVILLE STATE UNIVERSITY.

We tested different ratios of tetrachloroethylene (TCE) and methyl methacrylate (MMA) under a pH7 phosphate buffer to determine the optimal matrix composition for polymerization. Percent MMA varied from 0% to 100% by volume, in 10% increments. We achieved polymerization of the copolymer above 60% MMA. The optimal matrix, resulting in an extremely hard polymer, was comprised of 80% MMA, and 20% TCE. When the process was repeated without buffer, polymerization was slower under otherwise identical conditions. Polymerization was verified by IR and DSC. DSC confirmed a higher decomposition temperature for the copolymer, relative to MMA only, demonstrating a more stable system for the copolymer, and indicating a stronger matrix for this system.

THE LIFE AND LEGACY OF RACHEL CARSON. *AMANDA COFFMAN*, UNIVERSITY OF NORTH ALABAMA.

The courageous work of Rachel Carson inspired chemists to become more conscientious, the government to consider instigating regulations and the Environmental Protection Agency, and the formation of disciplines such as environmental biology and chemistry as well as Industrial Hygiene. Rachel Louise Carson used her skills as a scientist to collect data and evidence that illustrated the misuse and overuse of pesticides, particularly, dichlorodiphenyltrichloroethane (DDT). Additionally, she employed her talent as a New York Times bestselling author to publish her findings in the 1962 book Silent Spring. After defending her findings, in May 1963, Rachel Carson appeared before the Department of Commerce and requested the establishment of regulations for the use of harmful pesticides. Ten years later, the Environmental Protection Agency was commissioned, which immediately banned DDT. Presented here is a short synopsis of the life, legacy, and work of Rachel Carson, including the various pesticides analyzed, and the biomagnification of pesticide concentration levels that had been identified in the soil, water, and bird specimens. Her interdisciplinary contributions as a scientist, author, and humanitarian were directly and indirectly instrumental in promoting Green Chemistry Practices and Environmental Chemistry.

CHEMISTRY POSTER ABSTRACTS

GENERATING A STATE DIAGRAM OF LANGMUIR FILMS OF QUANTUM DOTS. *CUONG NGUYEN* AND JEFFREY WEIMER, UNIVERSITY OF ALABAMA IN HUNTSVILLE.

We present a state diagram to create Langmuir films of quantum dots (QDs). The approach is to deposit QDs that are dissolved in an organic solvent onto a water sub-phase as a free-standing Langmuir film, where they subsequently self-assemble. By controlling the concentration of the QDs and the volume of deposition, we create different structures and patterns in the films. Fluorescence from the films is imaged at macroscopic scales using a digital camera, and microscopic images are taken using Brewster angle microscopy (BAM). Terms such as coffee ring, splatter, and uniform spread are applied to define the macroscopic film structure qualitatively. Quantitative calculations are made of the minimum area spread by the solvent and the area ratio of the QDs relative to a theoretical monolayer. Histogram analysis from the camera images determines the relative populations of QDs in a monolayer versus multi-layers. The BAM images define the state of self-assembly at micron scales. From the results of the comprehensive imaging with different tools, we generate a state diagram that defines the qualitative and quantitative aspects of self-assembled, Langmuir films of QDs versus solution concentration and deposition volume. The outcome is a statement of the optimal concentrations and deposition volumes to deposit QDs as Langmuir films and thereby obtain consistent, uniform, well-ordered layers. The subsequent application is to improve the quality of coatings that can be formed using either LS or Langmuir-Blodgett methods.

EFFECTS OF SOLVENT VARIATION TO FUNCTIONALIZE GLASS WITH CHLOROTRIMETHYLSILANE. *JONATHAN COOKSTON* AND JEFFREY WEIMER, UNIVERSITY OF ALABAMA IN HUNTSVILLE.

We studied the variation of solvent in a known process of functionalizing glass surfaces with chlorotrimethylsilane (CTMS). The characteristics of glass treated with CTMS in toluene were previously documented. We compared the prior results to those using green and biocompatible alternatives ethyl acetate and acetonitrile. Contact angles of water droplets on the surfaces of these glass surfaces were measured using a Ramé-Hart goniometer. The values were related to uptake of CTMS on the surface. Uptake curves of coverage versus concentration were measured. Results suggest no significant difference occurs using different solvents. Storage of CTMS in acetonitrile solutions underwent chemical reactions to form crystal products.

CYCLIC ASYMMETRIC ALDOL ADDITIONS AND DEHYDRATIONS IN HOT PRESSURIZED WATER. *OLIVIA DEN BESTEN* AND JOHN BERCH, HUNTINGDON COLLEGE.

Green adaptations to known asymmetric aldol additions were investigated by replacing standard organic solvents with acidic, basic, and neutral Hot-Pressurized Water. Spontaneous dehydrations to the enone were observed using proline as the chiral catalyst; however,

stereoselectivity was very low. Given the hydrophilic nature of proline, more hydrophobic amino acids were tested. N-boc Alanine was evaluated as a catalyst in an attempt to mimic the secondary amine properties of proline. Significant increases in stereoselectivity and overall yields of alcohol and enone mixed products were observed.

GREEN MODIFICATIONS TO THE HAJOS PATHWAY TO AN IMPORTANT STEROID INTERMEDIATE. *CAROLINE COOPER* AND JOHN BERCH, HUNTINGDON COLLEGE.

Green modifications to the Hajos pathway to the Wieland-Miescher ketone where investigated. Special emphasis was given to the second step, synthesis of the alcohol, and third step, synthesis of the enone product, with goals of increasing stereoselectivity in hot pressurized water. Given the hydrophilic nature of proline, more hydrophobic amino acids were tested. Lastly, to mimic the secondary amine properties of proline, N-boc Isoleucine was evaluated. Both changes lead to significant increases in stereoselectivity and overall yields of alcohol and enone mixed products.

PHYSICS AND MATHEMATICS PAPER ABSTRACTS

RECENT PROGRESS IN HOLOGRAPHIC IMAGING OF OPALS. *D. BRIAN THOMPSON*, UNIVERSITY OF NORTH ALABAMA.

A Denisyuk reflection hologram is created by placing a holographic plate in front of an object so that the object is illuminated through the plate by a diverging, monochromatic laser beam. In this setup, a holographic image of the object is created by light wave interference between the incident beam and laser light reflecting off the object. Then the monochromatic holographic image can be reconstructed by illuminating the reflection hologram with a white light source. We have begun using several different colors of incident laser beams to produce full-color reflection holograms. We select gem opals as the objects to be imaged. The flashes of color in gem opals result from light wave interference, and so full-color reflection holograms are especially suited to reproducing these flashes of color. Here I demonstrate progress we've made in producing these holograms and set future goals for this project.

IN SITU CURRENT-VOLTAGE CHARACTERISTICS OF CDZNTE IN EXTREME THERMAL ENVIRONMENTS. *TYLER RICHARDSON*, MATTHEW DOWDELL, ROBERT E. SMITH II, EMMANUEL JODA, OLASUNKANMI ROWLAND, JONATHAN S. LASSITER AND STEPHEN O. BABALOLA, ALABAMA A&M UNIVERSITY.

There is a need for robust detection systems capable of operating in extreme thermal conditions, and Cadmium Zinc Telluride (CZT) shows promise for detection in extreme environments. CZT has been proven to be an effective room temperature radiation detection material with applications in medical imaging, nuclear non-proliferation, reactor monitoring, as well as gamma- and X-ray astronomy. This work was guided by research characterizing the electrical properties of CZT crystals following thermal treatments, however, in situ electrical properties characterization is needed to mimic real-life applications during exposure to environments with elevated temperatures. These experiments served to evaluate the electrical properties of CZT detectors during operation at elevated temperatures. I-V measurements were obtained while the detector, placed inside of a furnace, in the range of 20oC – 400oC. The results of this series of experiments is important in the application of radiation detection in extreme temperature environments, and the design of robust detection systems capable of effective operation during exposure to extreme conditions. In this study the I-V profiles of nuclear radiation detectors fabricated based on Cadmium Zinc Telluride (CdZnTe or CZT) semiconductor crystals are obtained and analyzed. The I-V notes a logarithmic decrease in resistivity to 200oC, and the deterioration of electrical properties is less drastic beginning with measurements at and following 250oC. The results of this study indicate that a CZT detector system can operate up to 100oC with minimal modifications to a detector configuration, beyond that point, further modifications will likely be required.

PHYSICS AND MATHEMATICS POSTER ABSTRACTS

THE FABRICATION OF ZINC OXIDE FILMS FOR SENSOR APPLICATIONS. *JEMILIA POLIUS* AND DR. MOHAN AGGARWAL, ALABAMA A&M UNIVERSITY.

In this work, the sol-gel and dip coating methods were used to fabricate zinc oxide (ZnO) films on quartz (SiO2) substrates under normal laboratory conditions. The thin films were synthesized via the sol-gel method by the hydrolysis of zinc acetate as the zinc precursor, isopropanol as the solvent medium, and monethanolamine as the stabilizing agent. The substrates were cleaned and coated using the dip coating apparatus to prepare thin films that consisted of 2 layers. Two cast films were prepared: one unannealed and the other annealed at 500°C by direct insertion in a furnace operated under atmospheric conditions. FTIR and Raman analysis of the resulting films were made to monitor the decomposition and oxidation reactions that occur during the fabrication process as well as process stability. The results of this study revealed that we successfully fabricated ZnO films in a simple and low cost method that could produce an n-type material for use in energy harvesting or other sensor applications.

We greatly acknowledge the support of Alabama Space Grant Consortium funding for supporting this research.

FACTORS AFFECTING RESISTIVITY OF CDZNTE CRYSTALS AT ELEVATED TEMPERATURES. *MATTHEW DOWDELL,* MATTHEW DOWDELL, OMOLOLA OJEWOLE, TYLER RICHARDSON, ROBERT SMITH II, JONATHAN LASSITER AND STEPHEN BABALOLA, ALABAMA A&M UNIVERSITY.

Cadmium Zinc Telluride (CdZnTe) crystals are of great interest due to the material's attractive properties and high stopping power for room-temperature X-rays and high energy gamma radiation detection applications such as in medical, industrial and astrophysical fields. Its ruggedness and ability to shape into small sizes further expands its scope of potential uses. To extend the use of devices based on CdZnTe crystals, the performance of the material at elevated temperatures should be studied, and is the focus of our parallel study. The aim of this work is to understand the observed changes in material properties of CdZnTe crystals at elevated temperatures. This work explores two factors, namely, surface and bulk impurities, as contributing factors to the observed changes. The embedded defects within the material, mainly inclusions, and surface morphology are studied at high temperatures and are presented in this work. The observed changes in morphology of the inclusions within the bulk of the materials at 400oC and other temperatures are shown.

MEASUREMENT OF IMPEDANCE OF LITHIUM ION BATTERY USING ELECTROCHEMICAL IMPEDANCE SPECTROSCOPY. *SALAH ELAFANDI,* AKSHAYA KUMAR AND PRAKASH SHARMA, TUSKEGEE UNIVERSITY.

Lithium-ion batteries have gained tremendous interest in the recent years because of their rechargeable property, low self-discharge and high energy density storage. Now days, they are widely used in portable electronics, military devices, electric vehicles and many aerospace applications.

In our research, we are using electrochemical impedance spectroscopy (EIS) to observe internal impedance changes under different state of charge conditions of lithium ion battery. EIS is a very powerful tool to gain insight into the structure and internal behavior of low impedance electronic storage devices such as batteries and super-capacitors. Our goal is to explore the internal structural changes in the battery at different state of charge conditions.

EIS is executed by applying a small sinusoidal potential (or current) to the battery for a wide range of frequencies. Then, we measure the response in terms of Impedance magnitude (Z), and a phase shift (Φ). The data observed is plotted in two ways known as Bode Plot and Nyquist plot to analyze the response of the battery.

Our research could lead to better understanding of performance of li-ion batteries and their internal structural behavior in different state of the charge conditions.

Acknowledgement: Authors are thankful to Department of Transportation (DOT) for funding grant and providing financial support.

UTILIZATION OF UV-V'S PHOTO- REDUCTION PROCESSES. *PRAKASH SHARMA*, AKSHAYA KUMAR AND SALAH ELAFANDI, TUSKEGEE UNIVERSITY.

Utilization of solar energy (UV-V's) and a coupling of novel semiconductor oxide nano-particles have been recently demonstrated with enhancement in oxidation and/or photo-reduction processes for the water/air detoxification and sustainable liquid fuel production respectively. For the successful physical adsorption of hydrogen molecule, we have developed novel polyaniline nanostructures via chemical templating and electrospinning Chemical or complex hydrides involving nano-MgH2 and transition metal nano-catalysts have been synthesized to tailor both the thermodynamics and kinetics of hydrogen (chemi) sorption respectively.

Acknowledgements: The authors will like to acknowledge NSF for providing funding to support the work.

PRODUCTION OF HYDROGEN FROM SOLAR ENERGY. *PRAKASH SHARMA*, SALAH ELAFANDI AND AKSHAYA KUMAR, TUSKEGEE UNIVERSITY.

The hydrogen is produced from the clean sources such as solar energy and water, it has to be stored by physiorption or chemisorption processes on to the solid state systems. We have developed nanofibers, nanotubes, and nanoparticles for clean energy. Based on the principle that the energy can be converted from one form to another, the chemical energy such as hydrogen is produced from the electrolysis of the water at a much lower voltage using RuO2

nanoparticles on the Si wafer substrate. Acknowledgements: The authors will like to acknowledge NSF for providing funding to support the work.

MODEL FOR PHOTOCATALYTIC AIR DISINFECTION. *SALAH ELAFANDI,* AKSHAYA KUMAR AND PRAKASH SHARMA, TUSKEGEE UNIVERSITY.

Various parameters such as light irradiation, photocatalytic air filter location, gas purging and sampling etc. were optimized via experimental models and develop a model for inactivation of microbes in a filter fiber media using mathematical and experimental data. Photocatalytic air disinfection (PAD) systems are used. The goal is to ensure that the proposed models are true representations of photocatalytic air disinfection. The models developed would be tested against experimental results. Acknowledgements: The authors will like to acknowledge NSF for providing funding to support the work.

PROBABILITY AND STATISTICS OF THE RAREST PHENOMENON IN CRICKET. *ARJUN TAN,* ARJUN TAN AND ALMUATASIM ALOMARI, ALABAMA A&M UNIVERSITY. MARIUS SCHAMSCHULA, ALABAMA A&M UNIVERISYT.

The Three Ws of West Indian cricket of Worrell, Weekes and Walcott have been labelled as the rarest phenomenon in cricket history. The batting careers of the Three Ws were nearly identical and their batting statistics were unusually similar. The resemblance coefficients for qualitative attributes between the Three Ws were 93.33% and above. The resemblance coefficients for quantitative attributes between the Three Ws ranged from 87.55% to 91.69%. The area within which the Three Ws were born is calculated to be merely 1.11 km2 using a Circle scheme, or 0.96 km2 using a Tri-focal Ellipse scheme. The magnitudes of the highest scores of the Three Ws were within 3% of one another; and they were all unbeaten, the probability of which is estimated at 3.7%. Finally, the probability that the Three Ws were all born in Barbados and had surnames beginning with W is estimated as 7.41 in a million!

OBTAINING EXACT VALUES OF SIN(Nπ/7). *ARJUN TAN,* ARJUN TAN, ALMUATASIM ALOMARI AND MARIUS SCHAMSCHULA, ALABAMA A&M UNIVERSITY.

Exact values of trigonometric functions are much sought after for their exactness and aesthetic appearance. These include trigonometric functions of sub-multiples of π. In this study, analytical expressions of sin(nπ/7), where n is a positive integer, are found by expanding the function as a polynomial, solving a cubic equation and extracting the square root of that equation. The solutions, even though not in the traditional form involving only integers and their roots, are nonetheless exact and complete. A geometrical representation and a geometrical construction provide great elegance and clarity to this method.

EMOTIONAL INTELLIGENCE AND THE SOUL: LIMITATIONS TO STRONG AI. *ETHAN WIDEN*, FAULKNER UNIVERSITY.

Limitations in the reach of programming beyond strict logic as well as weaknesses in the current tests used to determine human-level intelligence erect significant barriers to the creation of an artificial human being. For instance, the Turing Test is no longer sufficient because it does not produce a result that indicates a complete lack of intelligence when AI fails it. The test is also lacking because it does not indicate whether AI is fully capable of multifaceted, multifield intelligence. Additionally, the Chinese Room Argument by Searle refashions the question about the fundamental differences between syntax and semantics in such a way that the essential tool of computer science, the digital computer, may be insufficient to build strong AI. The flexible, dynamic nature of human emotion poses another and perhaps greater barrier to machine learning due to the binary nature of digital computations. If AI is intended to solve major human problems like poverty and homelessness, while considering the moral implications of its actions, it must understand itself and maintain an emotional connection with the people it will influence. The emotional capacity of a human and the semantic issues that arise from symbol manipulation detail a need for computer science to retool the way the discipline conceptualizes human cognition.

The next stone to tread on a path toward strong AI taking all these issues into consideration is to narrowly inquire into specific aspects of a human being's mind, body, and soul.

ENGINEERING AND COMPUTER SCIENCE POSTER ABSTRACTS

EOM OF GRAPHENE FOR THE DEVELOPMENT OF A TUNABLE FILTER. *JOHN WISE*, DYLAN MCKELVEY AND RAVI GOLLAPOLLI, UNIVERSITY OF NORTH ALABAMA.

Graphene Oxide consists of a hexagonal ring-based carbon network that has both sp2-hybridized carbon atoms and sp3-hybridized carbon atoms bearing hydroxyl and epoxide functional groups on both sides of the mono-atomic sheet. These groups provide a unique ability to tune the electronic and optical properties of graphene, which finds applications in the development of modulators, color filters, etc. Our study is concerned with both the theoretical understanding and experimental verification of the application of DC or AC signal across a graphene-based cavity to develop an electrically controlled tunable filter. The purpose of the numerical study will help the experiment which will evaluate for the optical modulation characteristics of a mono-atomic layer of graphene on a limited-band collimated light. Numerical results related to this effect and study will be presented.

IMPLEMENTING BELIEF PROPAGATION ON A GPU USING THE MERCATOR FRAMEWORK. *EDGAR FLORES*, SAMFORD UNIVERSITY. JEREMY BUHLER,STEPHEN COLE AND THERON HOWE, WASHINGTON UNIVERSITY IN ST. LOUIS.

This research lays a ground work to apply an irregular application of Loopy Belief Propagation (LBP) on general graphs to be processed on an NVIDA GPU using MERCATOR by first implementing a regular application of LBP on a CPU to solve for stereo vision, and finally, porting the regular application of LBP to an NVIDIA GPU using the MERCATOR framework. MERCATOR is a data streaming framework designed to make GPU programming more feasible, and handle the irregularities of streaming applications for GPU computations.

UNCERTAINTIES IN FITTING FORCE-DISTANCE CURVES FROM ATOMIC FORCE MICROSCOPY. *STEPHEN MORGAN*, UNIVERSITY OF ALABAMA IN HUNTSVILLE. JEFFREY WEIMER, UNIVERSITY OF ALABAMA HUNTSVILLE.

The goal of this project was to reverse-engineer the causes of uncertainty in parameters determined by curve fitting models to experimental data. Atomic force microscopy (AFM) is a powerful tool to measure interaction forces between macroscopic objects that have dimensions on the scale of microns. Data are collected as a function of separation distance and are curve-fit to theoretical or empirical equations. The Hamaker constant A is an unknown fitting parameters characteristic of materials in the objects. The fitting results for A are subject to uncertainty (error) due to noise on the measured raw data. We modeled force-distance curves as might be generated by AFM between a colloidal-size sphere and flat plate with added noise using Monte Carlo simulations. We also varied sphere radius and number of fitted data points. We quantified levels of uncertainty in the various input parameters. The noisy data obtained by

simulations were curve fit with non-linear regression methods to the original model equations (without noise). Trends in the relative uncertainty of A were then analyzed in relation to the uncertainties on the input parameters. Our outcome demonstrates how A is sensitive to uncertainties in the AFM system used to obtain the raw data.

SOCIAL SCIENCES PAPER ABSTRACTS

INCREASING AWARENESS OF TERMS OF SERVICE AGREEMENTS. *KELLY PIVIK,* MARY RIVERS, JARIUS REMBERT, OLIVER BURRELL AND JESSICA HOWARD, UNIVERSITY OF WEST ALABAMA.

Terms of Service Agreements (ToSAs) are a common part of life on the internet. However, there is ample evidence that most people do not read them, even though they are legally binding contracts (e.g. Bakows, Marotta-Wurgler, & Trossen, 2009; Hillman, 2006; Plaut & Bartlett, 2012). Plaut & Bartlett (2012) found that one of the most common reasons people cited for not reading the ToSAs was because they "are too long and boring" (p. 305). They also found that there were methods for increasing the likelihood of readership by changing specific characteristics of the written terms. However, there may be other ways to increase the likelihood of individuals familiarizing themselves with what they are agreeing to. The current study explored whether participants were more likely to take time to familiarize themselves with ToSAs under the following conditions: written, audio (someone reads the ToSAs), and visual (a video of someone reading the ToSAs). Implications for internet usage and further research will be discussed.

SECURITY CLEARANCE ISSUES IN NATIONAL DEFENSE. *CHARLES ROBERTS,* ATHENS STATE UYNIVERSITY. R. BRYAN KENNEDY AND SUSAN D. HERRING, ATHENS STATE UNIVERSITY.

When Winston Churchill assumed the office of British Prime Minister in 1940, he found the defense systems in a state of disarray. Nazi Germany had rearmed and was determined to avenge what they perceived as shoddy treatment in the Versailles treaty that ended World War I. Churchill and his advisors realized that it would be necessary to deceive the enemy, as well as their own friends and citizens, in order to conceal their complete lack of preparedness and buy time to prepare for war. Therefore, they began a campaign of bluff and stratagem that involved the military, politicians, civilians, and scientists. This paper looks at issues concerning protecting and safeguarding military and defense information prior to the start of World War II. It focuses specifically on the peculiar problem of safeguarding information in military research organizations staffed with high-level civilian intellectuals who may not understand or appreciate the importance of following security practices seven days a week, 24 hours a day, and who may behave or think in an unconventional manner that sometimes makes others uncomfortable.

THE PROBLEM OF SEXUAL HARASSMENT IN THE WORKPLACE. *MICHAEL ESSARY,* ATHENS STATE UYNIVERSITY. R. BRYAN KENNEDY AND SUSAN D. HERRING, ATHENS STATE UNIVERSITY.

Recent news coverage has brought the issue of sexual harassment to the forefront, with special emphasis on harassment in the workplace and in society as a whole. The resulting negative publicity and legal actions have led to resignations, public denouncements, and embarrassment

of numerous individuals, companies, and institutions. Sexual harassment is serious and can have long-lasting detrimental effects on both those who experience it and the organizations in which it takes place. It is disruptive, stressful to all involved, and often requires expensive legal or administrative solutions. In order to determine the prevalence of sexual harassment in organizations, a survey was developed and has been administered annually for several years to a convenience sample of Athens State University students employed in different organizations and companies primarily located in north Alabama. This paper reports the results of this continuing survey and compares them with national statistics and trends.

DOES WARFARE CHANGE THE FACE OF ETHICS?. *THOMAS PIEPLOW,* ATHENS STATE UYNIVERSITY. R. BRYAN KENNEDY AND SUSAN D. HERRING, ATHENS STATE UNIVERSITY.

Great Britain faced a difficult decision immediately before and during World War II. Facing the need to quickly build up their defenses, the British relied on a campaign of bluff and stratagem to gain time to prepare for war. One practice was the "wireless game" in which agents working undercover gathered and transmitted secret information concerning troop movements, battle plans, etc. The "game" depended upon the discovery and capture of the undercover wireless agents. Once a wireless post was captured, the transmission of false and deceptive information could begin. If the decision were made to send relief agents to a captured post, it was almost certain that the new agents eventually would be arrested and perhaps executed. The British dilemma can be summed up as follow: Is it ethical to sacrifice the lives of a few undercover agents to help save the lives of hundreds, potentially thousands, of Allied soldiers on the battlefield?

WHEN COMPUTERS FORCE US TO BECOME MORE HUMAN. *BENJAMIN BUSH,* AUBURN UNIVERSITY.

We know that technology will have an increasingly significant impact on the workplace of the future. Additionally, Forbes and CNN report that today's employees job hop at a much higher rate than the pension planned workforces of their parents. How will the workforce of tomorrow adapt and continue to thrive in an uncertain future?

Hard skills like public speaking and mastery of industry specific tools will never decrease in their importance. Unfortunately, these skills will always be subject to shifts in the audience's taste and updates in industry "best practices". The workforce of the future will benefit greatly from specializing in skills that are immune to changes in technology and employment trends. Investing in soft skills such as teamwork and empathy will allow future professionals the ability to enjoy more productive, more gratifying employment over the course of their career.

It is a simple statement but the workers who work well with others, will continue to work well with others. Teams of the future will no longer use human capital to complete repetitive tasks, crunch numbers, or document progress. Instead, future teams will need to unite their skills to question hidden motives, pursue innovation, operate more collaboratively, and ultimately bring the human race closer to itself.

This presentation will unpack how the teams of the future will be distinctly different as they incorporate design-thinking strategies to solve challenging, multifaceted, systematic problems.

BABES IN TOYLAND: NEGLECTING THE CONCRETE OPERATIONAL PHASE IN TOY DESIGN. *MICAH GAMACHE*, AUBURN UNIVERSITY.

Evidence shows there is a heavy focus in toy design by both developers and parents on the Sensory Motor and Pre-Operational child development phases. No expense is spared when it comes to learning numbers, shapes and colors. After that initial programming, our culture has become complacent, leaving our children to cheap disposable play items instead of embracing the next development phase. Leaving an entire phase of a child's psychological development unattended to.

This presentation will show the significance of the Concrete Operational phase in toy design. Exploring how imaginative play and story-telling is significant to a child's psychological development, how it has been neglected and how it can be better supported through toy design.

The resolution to this problem can be found in developing consistent design criteria (grounded in child psychology and play science) that creates a platform for story-telling. By designing toys with special attention given to enabling the child to generate a story we can develop creative supplements (toys) as educational tools for generative thinking and imaginative play.

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FOOD SECURITY AND LOCAL FOOD SYSTEMS FOR HEALTHY, LIVABLE COMMUNITIES IN NORTH ALABAMA. *BERNEECE HERBERT* AND TABARIS SMITH, ALABAMA A&M UNIVERSITY.

Food security, a condition in which "all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life", is one of several conditions essential to a healthy and well-nourished population. This research focused on food access and sources of food, along with the roles of local food systems in North Alabama, one of the fastest growing regions in Alabama. The overall goal was to develop a geographic picture of the Huntsville Metro region and the cities at risk for food insecurity. By noting places with high food insecurity risk and comparing them to places where food is available, analysis indicates areas of unmet need. The methodology was adapted from a study by Wauchope and Ward (2012) of the Carsey Institute using census tracts as a proxy for neighborhoods. Results indicate that in the Huntsville Metro region, one of the wealthiest regions in the State of Alabama, 55 percent of the population had a high risk of food insecurity with 45 census tracts identified as high risk and 71 percent with poverty rates greater than 10 percent.However, seven census tracts located in the City of Huntsville were observed to be hot spots for having significantly high percentages of its population that were located beyond 1 mile for urban areas from a supermarket.

NEUROFEEDBACK: A THIRD TREATMENT OPTION FOR CHILDREN WITH ADHD. *BEVERLY MYERS*, STILLMAN COLLEGE.

The aim of this presentation is to discuss the use of neurofeedback to improve attention and behavioral control by teaching children diagnosed with ADHD via visual and auditory reinforcement to self-regulate activity within the brain. Studies show over arousal of neural circuits within the brain can cause people to experience anxiety, anger, impulsiveness and distractibility. Under arousal of neural circuits within the brain can lead to lack of concentration, difficulty with waking-up and feelings of depression. People with unstable brain neural arousal may experience seizures, bipolar disorder, and post-traumatic stress disorder. Prior to undertaking neurofeedback training, children with ADHD initially undergo a quantitative EEG assessment (QEEG), a non-invasive, painless procedure used to detect areas of the brain that should be targeted for training. Children with ADHD can learn to use neurofeedback to train their brains to produce more beta waves. Beta waves occur when we focus on solving a problem or completing a task. An increase in beta waves can lead to improved attention and behavioral control.

SOCIAL SCIENCES POSTER ABSTRACTS

THE EFFECTS OF ROSEMARY'S ESSENTIAL OIL ON SHORT-TERM MEMORY. *JARIUS REMBERT* AND KELLY PIVIK, UNIVERSITY OF WEST ALABAMA.

Experimental studies suggest that rosemary's aroma influences cognition by increasing both short and long-term memory, and the speed and accuracy in cognitive tasks (Filiptsova et al., 2017; Moss, Cook, Wesnes, & Duckett, 2003; Moss & Oliver, 2012). However, in order to understand its full effect, it must be investigated in multiple conditions. Previous research regarding rosemary's aroma consists of assessing a participant during or after being in a room saturated with the smell (e.g., Filiptsova et al., 2017; Moss et al., 2012). This study investigated the effects of a single inhalation of rosemary's essential oil. It was hypothesized that a single inhalation, opposed to the secondary exposure of its aroma in a room, will render increases in cognition. In this study, participants' short-term memory was assessed – using a numbers recall task – after a single inhalation of either rosemary's essential oil or a placebo. Results of this study and its implications will be discussed.

GRANDIOSE AND VULNERABLE NARCISSISM ARE LINKED TO LOW RELATIONSHIP COMMITMENT. *KRISZTINA SZABO,* JAN-LOUW KOTZE AND JOSHUA FOSTER, UNIVERSITY OF SOUTH ALABAMA.

There is considerable research demonstrating a negative correlation between grandiose narcissism and relationship commitment. Much less research has examined the link between vulnerable narcissism and commitment. This poster presents evidence that both variants of narcissism are linked to low relationship commitment. Furthermore, an investment model analysis, using commitment mechanisms: satisfaction, quality of alternatives, and investment as putative mediating variables, reveals evidence that grandiose narcissists are less committed primarily because they perceive the alternatives to their relationships to be attractive, whereas vulnerable narcissists are less committed because they experience dissatisfaction in the relationships. These findings are generally consistent with trait-profiles and grandiose and vulnerable narcissism, which emphasize agentic-extraversion and acquisitiveness versus anxiety and negative self-other perceptions, respectively.

This poster presents evidence that grandiose and vulnerable narcissism are both linked to low relationship commitment. Mediation tests suggest that grandiose narcissists are less committed because they perceive attractive relationship alternatives; vulnerable narcissists are less committed because of dissatisfaction. Result are consistent with trait profiles of grandiose and vulnerable narcissism.

AGE-APPROPRIATE AND INAPPROPRIATE EXPRESSIONS OF NARCISSISM IN OLDER/YOUNGER PEOPLE. *JAN-LOUW KOTZE,*

KRISZTINA SZABO AND JOSHUA FOSTER, UNIVERSITY OF SOUTH ALABAMA.

It has been argued that narcissism is becoming more normal in recent generations. Although, we consider narcissism to be a serious (primarily interpersonal) problem, it is possible that some expressions of narcissism (e.g., exhibitionism) have become more normal and age appropriate in recent generations (i.e., young people). If true, these narcissistic expressions should predict outcomes related to narcissism differentially for older compared to younger people. In this poster, we present preliminary findings from a research program examining this hypothesis. One finding is that exhibitionism (presumed to be more age appropriate in younger people) predicts interpersonally harmful behavior (exploitativeness) more strongly in older people (40-60 years old) compared to younger people (18-25 years old). In contrast, leadership/authority predicted interpersonally harmful behavior similarly for older and younger people (if anything, the prediction was a little stronger for older people). These findings offer preliminary evidence that some of the ways that people express narcissism are more or less indicative of their overall personality makeup depending on whether the expressions are age-appropriate or not.

THE IMPACT OF PHOTOJOURNALISM ON THE SUCCESS OF SOCIAL MOVEMENTS. *HILLARY TAYLOR* AND ANDREA HUNT, UNIVERSITY OF NORTH ALABAMA.

This research examines how photographs can frame public opinion and political discourse surrounding social movements. A content analysis will be conducted of photos taken during the Civil Rights Movement and the ongoing Black Lives Matter Movement. The contents of each photo will be categorized to discern the different characteristics of each photo (e.g., framing of the photo, the angle, the subject(s), and the actions taking place within the photo and how that relates to their overall text). The research also includes historical analysis into the progress of each of these social movements, the journalistic practices of that era, how media framed the movement's progression, and as a result, the public's opinion of each movement. Information will be gathered from primary sources such as newspapers and magazines in order to gather data concerning the photographs that were published during these time periods. Examples of photographs from the Civil Rights Movement include Bill Hudson's photo of police dogs attacking civilians and Bob Adelman's photo of demonstrators in Birmingham being sprayed with a water hose. Photographs from the Black Lives Matter Movement include images of the protests in Ferguson, Iesha Evans being detained in Baton Rouge, and Bree Newsome taking a Confederate flag down in North Carolina. The photojournalistic practices from each movement will be compared to determine if there are significant differences or similarities that could also affect the framing of photographs.

NONDIRECTIVE PLAY THERAPY: AN EFFECTIVE TREATMENT FOR SURVIVORS OF TRAUMA. *BEVERLY MYERS* AND SANDRA JAMISON, STILLMAN COLLEGE.

The purpose of this presentation is to discuss the use of nondirective play therapy to treat survivors of trauma. Studies show the majority of people will experience at least one traumatizing event in their lifetime. A wide range of traumatic events can increase one's risk for depression and anxiety, chronic physical conditions, and posttraumatic stress disorder (PTSD). Survivors of trauma are often unaware of the triggers that cause emotions experienced during the traumatic event to be re-experienced weeks, years and decades later. A reliving of trauma memories can have devastating effects on the survivor's ability to concentrate and control impulses. Flashbacks and nightmares may haunt the person. An eating disorder or substance addiction may develop. Nondirective play therapy can offer survivors of trauma a safe way to express and work through unconscious conflict, which in turn, may potentially lead to improved mental/physical health outcomes and an improved quality of life.

ANTHROPOLOGY PAPER ABSTRACTS

EVIDENCE FOR THE ENDEMIC SPECIATION OF ROBUST AUSTRALOPITHS AT STERKFONTEIN, SOUTH AFRICA. *JASON HEATON*, BIRMINGHAM-SOUTHERN COLLEGE.

During the early Pleistocene, dramatic environmental change appears to have led to rapid speciation within the hominin lineage. And for over a million years, our ancestors lived alongside a rather enigmatic group, the robust australopithecines. Their origins remain uncertain even 70 years after their discovery. The main robust species, *Australopithecus aethiopicus*, *A. boisei* and *A. robustus*, exhibit a suite of uniquely derived characters relating to an extreme development of their teeth, especially premolars and molars, and jaws. What remains unclear is whether this group is monophyletic or simply a case of homoplasy among hominins. To assess dental variation within the South African sample, breadth and length measurements for specimens (N=81) attributed to *Australopithecus africanus/prometheus*, *A. robustus* or *A. sediba* were contrasted. Within the Sterkfontein sample, a high degree of variability was observed while a steady increase in overall tooth size was noted at the later sites, such as Swartkrans and Kromdraai. In contrast, *Australopithecus sediba* exhibited comparatively small teeth (like early Homo) combined with molarized premolars and may represent a late-occurring gracile form of A. africanus. Some Sterkfontein specimens (e.g. StW 252 and StW 498) exhibit morphology that seemingly bridges the gap between the gracile and robust forms in South Africa. Therefore, the preliminary analysis of dental variation suggests that the robusts originated as two separate (i.e. diphyletic) lineages within eastern and southern Africa.

CONNECTING THE PUBLIC TO THEIR NATURAL AND CULTURAL HERITAGE. *ALEXANDRIA SMITH*, US ARMY CORPS OF ENGINEERS.

Using the US Army Corps of Engineers' ecosystem restoration study of Proctor Creek in Atlanta, Georgia, I will be explaining the local, regional, and national implications of connecting communities with their natural and cultural resources. This presentation will include the challenges and opportunities with creating combined ecological recreation and historic trails. This will include discussions of how these resources are intertwined with the local economy and culture, including community ties to ecological recreation; community ties to cultural resources in the area; the economic viability of ecological recreation and heritage trails; and how this recreation could be used as a means to preserve these ecological and cultural resources. I will be using Alabama's Mobile Bay and Delta and its extensive natural and cultural resources as a proposed comparative case study. This comparison will consider how partnerships between federal and local governments and local communities could enhance ecological recreation and heritage trails in the Bay and Delta, especially in light of the recent potential discovery of the wreck of the slave ship Clotilda.

CAN GORILLA DENTAL WEAR SCORES BE USED AMONG FOSSIL HOMINIDS?. *SARAH CATHERINE MURPHY*, BIRMINGHAM-SOUTHERN COLLEGE. JASON HEATON, N/A.

Early hominid paleodemography is an ongoing issue, as fossil remains are often discovered in a fragmentary state. Fortunately, dental enamel is one of the hardest substances in the body; therefore, isolated teeth and jaws are among the most frequently recovered fossil elements. Our goal is to determine the relationship between the wear stages of teeth, to better understand attritional patterns among *Gorilla*. Each individual tooth was assigned a wear score based upon Smith's (for incisors, canines and premolars) or Scott's (for molars) method of wear categorization. Our sample includes both, males and females, of *Gorilla* (N=61). Among our *Gorilla* sample, we found significant correlations ($p<0.05$) between wear stages and in tooth classes (e.g. incisor, canine, premolar and molar). Our study suggests that upon recovery of an isolated tooth, researchers could predict teeth that may belong to the same individual (within a site's sample). The result would refine calculations of the number of individuals preserved, as well as lead to a better understanding of fossil demographic patterns. Preliminarily, we applied this technique to robust *Australopithecus* from Swartkrans, South Africa.

BARBARY MACAQUE ETHNOPRIMATOLOGY AND INTERDISCIPLINARY CONSERVATION IN NORTHERN MOROCCO. *SHERRIE ALEXANDER*, UNIVERSITY OF ALABAMA AT BIRMINGHAM.

The endangered Barbary macaque (*Macaca sylvanus*) of North Africa, the only macaque outside of Asia and north of the Sahara, has experienced a continual decline in numbers over the course of several decades. Moreover, understanding perceptions of endangered species and attitudes towards conservation may be critical to conservation initiatives and their durability. Using an ethnoprimatological approach, I look at perceptions of Barbary macaques as well as macaque conservation in the Rif Mountains of northern Morocco. In doing this, I investigate the practices of Barbary Macaque Awareness and Conservation (BMAC), a Moroccan NGO whose sociocultural approach to macaque conservation seeks to aid both people and macaques. Additionally, I conducted semi-structured interviews (n=24) with urban and rural Moroccans exhibiting various degrees of contact with macaques and BMAC. Results indicate that macaques are commonly viewed as valuable endemic species and seen as important to local ecologies. There were significant differences in how urban and rural experiences shaped their perceptions of macaques. Despite some negative religious connotations, respondent attitudes were positive towards macaques and macaque conservation across all groups. BMAC's biosocial peace approach to conservation, which is interdisciplinary and highly inclusive of local populations, may be a critical model to follow for future primate conservation endeavors.

A BANNERSTONE PRODUCTION KIT FROM THE THRASH SITE. *ZACHARY SMITH*, TROY UNIVERSITY.

The purpose of this paper is to discuss a bannerstone production kit found at the Thrash site (1PK71) last summer. The kit includes two quartzite hammerstones and an unfinished possibly

catlinite bannerstone, found on what seems to be a production floor. Other artifacts found at 1Pk71 date the bannerstone to the Late Archaic. I will attempt to explain the methods used to shape, bore, and polish the stone during production. The exotic material used in the production of the bannerstone suggest that the people of the Late Archaic who occupied this site may have had trade contacts as far as the Great Plains.

THE ARTIFACTS OF THE LIVING FLOOR AREA AT THE THRASH SITE: 1PK71. *MARINDA LAWLEY*, TROY UNIVERSITY.

This is a discussion on the found artifacts of an obvious living floor within a few units at the 1Pk71 site, or Thrash site. This site is a known Late Archaic site located about a half-mile from the banks of the Pea River in Pike County, Alabama. Some of the artifacts found include projectile points, a bannerstone production kit, two large clay nodules that are believed to be residual from a cooking technique used by the occupants of the site, and other artifacts which suggest a significant amount of domestic activity. The units in discussion also contained a large pit that contained multiple elements of a cooking pit, as well as a trash pit.

STEM EDUCATION PAPER ABSTRACTS

USING INTERNET OF THINGS FOR AN ALTERNATIVE PEDAGOGY FOR INSTRUCTORS. *ANTHONY WINCHESTER*, KARTHIKEYAN LINGASUBRAMANIAN, THE UNIVERSITY OF ALABAMA AT BIRMINGHAM.

The classroom of the Industrial Revolution is phasing itself out. Today's students are being raised in the Digital Age, and the lecture based classroom does not work in entirety for them as in previous generations. The discussion bores them after only a few minutes, and they are on to the next thing, even if it is being entertained through social media. Their learning style goes beyond the outdated lecture. To grasp the attention of the student in the Digital Age, instructors must consider strategies that are outside the methodology that they have been taught to use. This work explores the use of Internet of Things (IoT) technology in education to effectively prepare the student for the future. IoT, which is an engineering technology, primarily depends on computational and communication mediums. Our work focuses on the development of a computational medium which is free-standing, portable and cost-effective with communication abilities. The platform is designed to be cost-effective, and simple to operate so that teachers without technical or engineering training can employ it. This tool also allows students to learn themselves about a given environment through sensors and analyze it. Such an easily portable system will enable students to have off-the-class education, which will be more hands-on and practical.

UNDERSTANDING AND USING PIAGET-POPPER CONSTRUCTIVISM METHOD WITH SYMBOLIC MENTAL STRUCTURES AND PATTERNS TO IMPLEMENT CRITICAL THINKING. *MATTHEW EDWARDS*, ALABAMA A&M UNIVERSITY.

The human intellect persists in a dynamical equilibrium state while maintaining self-satisfaction and a contented worldview by constantly integrating and assimilating incoming information that resonates with its current understanding and previous experiences. Learning a new concept requires the mind to enter into a state of disequilibrium and then progress through identified stages to re-establish eventually a new state of equilibrium. This equilibrium state allows reflective thought and reassurance to the individual about what is already known albeit it with a limited generalization. However, with the onset of receiving and assimilating a new concept, you are thrown into a state of mental disequilibrium. It is the need to remove the disequilibrium that requires either critical thinking by the individual, resulting in an expanded worldview, or a discounting of it while maintaining a disengaging behavior. The former allows re-establishment of mental equilibrium with an expanded understanding, and the latter persists by never departing from equilibrium. In either case, the intellect has its equilibrium—one instance with the requisite development of new understanding, the other without change. To address the lack of effective learning, we have developed the notion that individual Symbolic Mental Structures, as a key component of constructivism, can assist the underachieving student to become more engaged in the physical sciences and academia in general. This approach

requires us to revisit Piaget's constructivism theory, Karl Popper theory with its falsifiability criterion.

"THIS COULD BE A GAME!" : ENERGIZE AND ENGAGE YOUR CLASSROOM INSTRUCTION WITH A GAMIFIED STUDENT RESPONSE SYSTEM. *SAMIKSHA RAUT,* UNIVERSITY OF ALABAMA AT BIRMINGHAM.

Student Response Systems (SRSs) or "clickers" are small hand-held devices that are popularly used in today's classroom as an engagement and assessment tool. An advantage of using SRSs is that it can give instant feedback to both the students and instructors about a concept under study. Besides, it guarantees anonymity, efficiently gathers student responses and prevents peer-to-peer interactions that may otherwise interfere with a typical classroom assessment. However, usage of these devices involve higher costs for the students and often pose technological challenges for an instructor. Therefore, very recently an extension of SRSs known as "gamification" or the use of game-like elements in non-game contexts has become popular in education. Hence, this presentation is geared towards discussing the distinct benefits and advantages of utilizing a freely downloadable gamification software "Kahoot!" as an effective tool to energize and engage your classroom instruction.

IMPROVING UNDERSTANDING OF NATURAL SELECTION USING EVOLVING DIGITAL ORGANISMS. *MICKIE POWELL* AND SAMIKSHA RAUT, UNIVERSITY OF ALABAMA AT BIRMINGHAM.

Undergraduate biology students often struggle with the concepts of natural selection and how it can result in evolution of species. Since the time scale of evolution is difficult to reproduce in the lab, computer software has been developed that makes it possible for students to design and perform experiments to test hypothesis about the mechanisms of evolution using digital populations. Avida-ED is an open access digital software program developed, at Michigan State University, as a tool to help teach about evolution and the scientific method. We have applied this program to help students gain a better understanding of how random mutations and natural selection result in populations becoming adapted to their environment. Students use the Avida Ed program to investigate how random mutations and the presence of antibiotics in the environment can give rise to antibiotic resistant populations of bacteria. Students can then continue their investigations and formulate independent hypothesis and design experiments in Avida-ED to test them. The program generates real unique data for each experiment, which can be graphed and analyzed statistically. The versatility of the platform allows it be introduced in courses from the freshman to the senior level.

EFFECTS OF INSTRUCTIONAL STYLE ON STUDENT PERFORMANCE: A COMPARATIVE ANALYSIS OF A NON-MAJORS BIOLOGY COURSE. *UDUAK AFANGIDEH*, FAULKNER UNIVERSITY. BISOO MARANDA, ALABAMA STATE DEPARTMENT OF EDUCATION.

In most universities, students are required to take a natural and/or physical science course as part of the core curriculum. While this is often a freshman level class, students at all levels find these courses challenging resulting in high withdrawal and failure rates. While there is an abundance of research suggesting factors that are responsible for student's poor performance in science courses both at the high school and undergraduate levels, here is a continued need for science professors to present scientific information in a way that will engage the non-science major. This paper investigates the role that the method of instruction has on student performance. The study was conducted over a four – year time frame involving about 400 students who are non-biology majors enrolled in an introductory biology class at Faulkner University. Two different methods of instruction were used in alternating semesters by the same instructor to reduce sources of bias and error. Correlation analysis was carried out and results indicated that there was a strong positive correlation ($r = 0.98$) between the methods of instruction and student performance, There was an increase in student engagement with course material which resulted in better test grades, and an improvement in all the variables investigated. Student responses during end of session evaluation surveys also supported these findings.

LESSONS FORM THE WAR ZONE: THE 2017 TOTAL SOLAR ECLIPSE MANIA. *MEL BLAKE*, UNIVERSITY OF NORTH ALABAMA.

The Great American eclipse of august 2017 offered an unprecedented opportunity to engage the public with science ans astronomy. The entire country was obsessed with the event, which was probably the most watch event of the entire year. The frenzy created a rush for eclipse glasses and for astronomers to give presentations. there were floods of emails and phone calls that came in faster than they could be answered. It created an almost under siege feeling to the whole thing. I will discuss some of the lessons I learned about how to handle a large event, and some of the deficiencies in my planning for the outreach that others might benefit from if they become part of a large event.

A RADIO ASTRONOMY CUBESAT FOR STEM EDUCATION. *DR. J. WAYNE MCCAIN*, ATHENS STATE UNIVERSITY. COLLIN ROGERS MCCAIN, CALHOUN COMMUNITY COLLEGE.

This paper summarizes research and a proposal to develop a Radio Astronomy (RA) CubeSat, small satellite, in conjunction with the Society of Amateur Radio Astronomers (SARA) with direct application to STEM education in the North Alabama area. The project will involve collaboration between SARA, the SPARK Academy at Cowart Elementary School (Athens), Athens State University, Vanderbilt University (Nashville, TN), and Florida Institute of Technology (Melbourne, FL). This 2-4 year project would place a 4x4x4 inch, 3-pound autonomous satellite in low Earth orbit to monitor low and very low-frequency radio signals

from our solar system which are normally 'blocked' by Earth's ionosphere. Typical signals are from our Sun and the Jupiter/Io magnetic storms but also include deep-space emissions from other celestial bodies and phenomena.

THE TITANIC DISASTER - POOR RISK MANAGEMENT. *LOGAN SULFRIDGE*, ATHENS STATE UYNIVERSITY. J WAYNE MCCAIN, ATHENS STATE UNIVERSITY.

This student research paper examines the historical Titanic's sinking of 1912 and the issues that led to the demise of this 'unsinkable' ship, the leading technical achievement of its time. In addition, the ship's operational management is contrasted against modern-day risk management planning methodology showing short-comings and the human errors involved that precipitated the event. Even today, there are lessons to be learned from this horrific and arguably unnecessary loss of over 1500 lives.

IMPROVING SUPPLEMENTAL INSTRUCTION THROUGH ACTIVE-LEARNING MODULES IN INTRODUCTORY BIOLOGY. *SEBASTIAN SCHORMANN*, JAMES BOYETT AND SAMIKSHA RAUT, UNIVERSITY OF ALABAMA AT BIRMINGHAM.

Over the last decade there has been a heightened focus to increase the retention of Science, Technology, Engineering, and Mathematics (STEM) majors, with an intent to enhance the diversity of STEM professionals. Many of these retention efforts are focused on large enrollment introductory courses that undergraduates take as freshman or sophomores and are characterized by the highest attrition rates. In response to this problem, numerous studies have shown that incorporating active-learning practices in the classroom can lower the failure rates and also greatly benefit first generation underrepresented minority students. Despite these advantages, active-learning does become challenging to implement in the classroom as the student to the instructor ratio increases. In order to overcome this issue, it has been suggested to introduce active-learning outside the classrooms in peer led sessions also known as "Supplemental Instruction" (SI). Therefore, the goal of this study is to investigate the impact of active-learning modules in the SI sessions. We are currently implementing this model for our spring 2018 Introductory Biology I & II courses. Initial observations have suggested greater student engagement, motivation, and understanding of the concepts. Additional, qualitative results will be gathered through student surveys rating the effectiveness of these sessions at two time points during an entire term. We believe that data from this study will enable us to recommend the introduction of active-learning modules as an effective avenue in the SI to reduce STEM attrition in introductory level classes.

STEM EDUCATION POSTER ABSTRACTS

IMPROVING SUPPLEMENTAL INSTRUCTION THROUGH PEER-LED GROUP DISCUSSION IN INTRODUCTORY BIOLOGY. *SEBASTIAN SCHORMANN* AND JAMES BOYETT, UNIVERSITY OF ALABAMA AT BIRMINGHAM.

Science, Technology, Engineering, and Math (STEM) majors have experienced a high attrition rate within the United States despite extensive efforts by the education system to address this concern. Large enrollment introductory courses taken by undergraduates as underclassmen have been identified as a principal cause of the leakage in the STEM academic pipeline. Intervention in the form of Supplemental Instruction (SI) has been implemented to increase STEM retention, but traditional lecture models commonly employed in SI have failed to develop conceptual comprehension and other critical thinking skills required for students in future STEM careers. The scope of this investigation was to address this shortcoming in SI by employing more-effective active learning models within the sessions. This goal of our investigation was approached by presenting students with open-ended questions and asking students to form groups to discuss the questions. Implementation of the proposed changes are being conducted during this current spring 2019 semester in Introductory Biology I and II classes at UAB. Observational results have shown greater student engagement, motivation, and understanding of the material; further qualitative results will be gathered through student surveys rating the effectiveness of SI sessions at the midpoint and conclusion of the term. Exams are regularly conducted as part of the course, and student performance on these exams will be analyzed for the efficacy of this intervention. The outcomes assessed from this project can be utilized to make foundational improvements in SI and establish it as an effective avenue to reduce STEM attrition in introductory level classes.

SUSTAINED TEACHING MENTORING WORKS AND BENEFITS MENTORS AS WELL AS THOSE MENTORED. AN UPDATE ON THE PROMOTING ACTIVE LEARNING AND MENTORING (PALM) NETWORK. *SAMIKSHA RAUT*, UNIVERSITY OF ALABAMA AT BIRMINGHAM. SARA BROWNELL, ARIZONA STATE UNIVERSITY. SUE WICK, UNIVERSITY OF MINNESOTA-TWIN CITIES. AMY PRUNUSKE, MEDICAL COLLEGE OF WISCONSIN. MICHAEL WOLYNIAK, HAMPDEN SYDNEY COLLEGE. MARK PEIFER, UNIVERSITY OF NORTH CAROLINA CHAPEL HILL.

Many instructors and instructors-to-be have heard of the value of using active learning to guide students to deep learning of course material. Some have attended workshops or several-day immersion experiences to learn how to employ effective active learning activities. In spite of best intentions, plans to actually implement active learning techniques often collapse once an instructor gets caught up in the academic year. To address this situation, ASCB, in cooperation with other professional societies and academic groups and with NSF funding, established the

Promoting Active Learning and Mentoring (PALM) Network. This program provides PALM Fellows with a one-on-one teaching mentoring relationship for at least one semester with a mentor experienced in active learning. Participants to date have come from various partner societies within the Network. Analysis of teaching behavior before and after mentoring provides evidence that Fellows have been able to increase their use of active learning in accord with the specific objectives they had identified. Interviews with participants indicate that Fellows gain more confidence in their ability to apply active learning principles in future coursework, and mentors appreciate the opportunity to reflect on, refine, and expand their own practice of active learning approaches.

A RADIO ASTRONOMY CUBESAT FOR STEM EDUCATION. *COLLIN ROGERS MCCAIN*, CALHOUN COMMUNITY COLLEGE. DR. J. WAYNE MCCAIN, ATHENS STATE UNIVERSITY.

This poster summarizes research and a proposal to develop a Radio Astronomy (RA) CubeSat, small satellite, in conjunction with the Society of Amateur Radio Astronomers (SARA) with direct application to STEM education in the North Alabama area. The project will involve collaboration between SARA, the SPARK Academy at Cowart Elementary School (Athens), Athens State University, Vanderbilt University (Nashville, TN), and Florida Institute of Technology (Melbourne, FL). This 2-4 year project would place a 4x4x4 inch, 3-pound autonomous satellite in low Earth orbit to monitor low and very low-frequency radio signals from our solar system which are normally 'blocked' by Earth's ionosphere. Typical signals are from our Sun and the Jupiter/Io magnetic storms but also include deep-space emissions from other celestial bodies and phenomena.

ENVIRONMENTAL AND EARTH SCIENCE PAPER ABSTRACTS

BENTHIC FORAMINIFERAL SPECIES DISTRIBUTIONS IN EASTERN LAKE, WALTON CO., FL. *KAYLYN BELLAIS*, MURLENE CLARK AND STEVEN SCHULTZE, UNIVERSITY OF SOUTH ALABAMA.

The coastal dune lakes of Walton Co., Florida represent a rare environment only found in a few other areas of the world, such as New Zealand and Madagascar. The lakes originally formed as estuaries in the geologic past, when sea level was much lower than today. At the end of the last ice age, these estuaries became drowned and separated from the Gulf of Mexico by migrating sand as rising waters moved into the area. Today, the coastal dune lakes are largely controlled by streams that drain into them, although they are periodically invaded by saltwater from the Gulf during storm surges. The ecology and overall health of these lakes has become an important environmental concern as the area has developed as a tourist center. An investigation of benthic foraminiferal populations has revealed information about the salinity, pH, and bottom substrate of this understudied environment. Ten samples were collected from a north-south transect of Eastern Lake using a box core sampler. Samples were washed through a 63 micron sieve, and air dried. benthic foraminiferal were then picked, mounted on a slide, and identified using a binocular microscope. The population in the lake is a zoned microcosm of foraminiferal populations described elsewhere along the Gulf Coast. Agglutinated forms are predominant in the less saline areas of the lake, while carbonate forms dominate areas under the influence of invading saltwater.

EXAMINATION OF EXTREME COLD AND FROST IN ALABAMA CITRUS. *SAMANTHA DARRING* AND STEVEN SCHULTZE, UNIVERSITY OF SOUTH ALABAMA.

Frost and extreme cold has been a limiting factor in the production of citrus in the central Gulf Coast region. Extreme cold events (<-6°C) can bring heavy damage to citrus crops, particularly if they are long lasting. While these are rare in the region, they can completely wipe out entire groves, as seen in the late 1980s. Frost events (<1°C), which are far more common, can be particularly damaging if the trees have gone in to their bloom stage. Such temperatures can kill of the flower blooms, which will decrease the amount of fruit set on each tree. This study has looked at these events within a Satsuma Orange (*Citrus unshiu*) grove in Fairhope, Alabama throughout the winter of 2017-2018. 22 micrologger weather sensors have been deployed within the grove across 11 trees. Each of the selected trees have two sensors in a vertical column on the west face of each tree at a height of 1 and 2 meters above the ground. Temperature, relative humidity, and dewpoint have recorded every minute, on the minute, since early November 2017. Multiple frost events and at least two extreme cold events have occurred in the region while the grove was monitored. Temperature inversions, deep freezes, major cold fronts, and even frozen precipitation events all are clearly on display in the . The results and implications will be discussed.

PRECISION AGRICULTURE AND THE EFFECT OF MICROCLIMATES ON CROP DEVELOPMENT. *STEVEN SCHULTZE*, UNIVERSITY OF SOUTH ALABAMA.

The field of precision agriculture has brought the concept of "Big Data" and data analytics to the world of agriculture. Growers view sub-field agricultural variables in order to make management decisions across their crops rather than applying a one-size-fits-all technique. However, precision agriculture has mostly focused on the effects of soil changes on a sub-field basis as the primary determinant for yield and quality variability within the same plot of land, while microclimate influences have largely been ignored. The goal of this study was to analyze the differences in these weather variables at the highest spatio-temporal resolution possible over the course of a growing season. Using properly calibrated weather microloggers placed in aerated PVC housings, we placed several "micronet" stations in a satsuma orange (*Citrus unshiu*) grove and measured temperature, relative humidity and dewpoint for every minute for 66 days. These variables were compared to the yields of each individual tree. Our "micronet" found extreme temperature variability, as high as 10˚C in some instances, in the grove. Differences in GDD accumulation for each tree were found to be as much ±10% the mean. As such, each tree faced different micrometeorological conditions, and we discuss the implications. Ultimately, the study of microclimates on a sub-field level has similar, if not greater, utility than soil variability on a sub-field level within the context of precision agriculture.

FEASIBILITY OF GROWING BEER HOPS IN THE SOUTHERN ALABAMA REGION. *WAYNE WILLIAMS* AND STEVEN SCHULTZE, UNIVERSITY OF SOUTH ALABAMA.

Hops (*Humulus lupulus*) are grown on a vine that produce flowers that which are used in the production of beverages. Production of hops is mostly confined to the areas found between 35 and 55 degrees north latitude. This is mostly due to the length of the day, and the angle of the sun in sky during the growing season. Being located south of the 35˚N line, there is very little to no hop production in the state of Alabama. However, hop production has begun in the surrounding states, most notably in Florida. While there are certain obstacles to growing hops, these can be counteracted by using certain farming practices and through close observation of issues that can arise as the hops reach maturity. Working in conjunction with Auburn University at their Research and Extension Center in Fairhope, AL, a "variety trial" was composed of 5 vines of three varieties of hops (Cascade, Chinook, and Neomexicanus). This paper will discuss the results of the variety trial, focusing on the positive and negative experiences found during the inaugural growing season of 2017. Further expansion of the trial is planned for 2018.

ENVIRONMENTAL AND EARTH SCIENCE POSTER ABSTRACTS

IMPACT OF INVASIVE ANTS (HYMENOPTERA: FORMICIDAE) ON CARRION BEETLE ABUNDANCE ACROSS AN URBAN-RURAL GRADIENT. *GRANT GENTRY* AND HOPE REAMER, SAMFORD UNIVERSITY. ISAAC HEINKEL, UNIVERSITY OF NORTH ALABAMA.

As urbanization increases, the abundance of invasive ants that thrive in disturbed habitats increases. Invasive ants, such as *Solenopsis invicta*, can reduce the abundance of native ants and disrupt arthropod communities. Using the abundance of carrion beetles in the Silphidae as our measure, we sought to determine the impact of invasive ants across an urban-rural gradient. We chose a total of twelve sites along this gradient and used pitfall traps baited with chicken to capture both the silphid beetles and ants. We found that as the proportion of native ants at a site increased the abundance of silphids increased, however as the proportion of invasive ants captured as a site increased, the abundance of silphids decreased. As with native ants, invasive ants may have a particularly negative effect on silphid abundance because of their superior competitive abilities.

A NOVEL TESTING METHOD FOR MANGANESE CONCENTRATION IN DRINKING WATER. *ANNA HOLMES*, EMANUEL WADDELL AND BERNHARD VOGLER, UNIVERSITY OF ALABAMA IN HUNTSVILLE.

Manganese (Mn) is a trace metallomic requirement in biological systems that can wreak havoc when hyperaccumulated, manifesting in neurologically degenerative pathologies. One mode of biological entry is through water contaminated by natural and industrial sources. Removal of manganese oxides are achievable in water treatment facilities, however Mn(II) ion in solution eludes conventional entrapment. Approved Environmental Protection Agency (EPA) testing methods for the detection of manganese in water are toxic and difficult to perform outside of advanced analytical laboratories, requiring water processing facilities to outsource costly tests. The colorimetric method for quantifying manganese concentration in water, the persulfate method, has a "low detection limit" of 0.210 mg/L, - an order of magnitude out of range of the "maximum allowable limit" set for pharmaceutical or bottled drinking water (0.01 mg/L and 0.05 mg/L respectively) established as a global standard. As yet no limit has been established for tap water. To address the need for a safer and compliant testing method, a multistep synthesis was conducted with the reagents characterized by proton nuclear magnetic resonance (Hydrogen-1 NMR) and confirmed as an oxime producing a colorimetric response within the compliance range. The reagent has been stabilized in ammoniacal buffer solution that can easily be used by local water processing facilities to detect manganese by simple spectrophotometric methods. Current efforts are being conducted to determine any possible metal contaminants that may cross react with the testing method and to determine what processes need to be included in a protocol to eliminate interference.

RADIAL GROWTH RESPONSE OF CONIFEROUS AND DECIDUOUS TREES TO LATE GROWING-SEASON FROSTS IN MICHIGAN.

ABIGAIL COLEY **AND DR. KETIA SHUMAKER, UNIVERSITY OF WEST ALABAMA. DR. CAROLYN COPENHEAVER, VIRGINIA TECH.**

Extreme climatic events, such as late frost, may have a greater impact on long-term tree growth than previously realized. We tested whether late frost reduced tree-ring growth in coniferous and deciduous trees. To observe differences in tree-ring width during frost and non-frost years, we used superposed epoch analysis and a t-test to analyze tree-ring data from three coniferous (eastern hemlock, white pine, and red pine) and three deciduous (red maple, red oak, and bigtooth aspen) trees. The frost years had significantly narrower ring widths than non-frost years ($t = -4.261$, $P = 0.004$). There was no evidence that deciduous trees had a greater reduction in tree-ring width than coniferous trees during frost years. Therefore, late frosts reduce growth in both coniferous and deciduous trees.

HEALTH SCIENCE PAPER ABSTRACTS

TEAM-BASED LEARNING (TBL): A STRATEGY FOR DEVELOPING NURSING STUDENTS' NCLEX PREPARATION. *MERRILL HOWARD*, GRAND CANYON UNIVERSITY. ELLEN BUCKNER, SAMFORD UNIVERSITY.

Team-based learning (TBL) is an active learning strategy to create a collaborative educational environment. Students apply knowledge through team building discussion verses memorization. The teaching-learning strategy was designed using the principles of TBL of preparation, in-class readiness assurance testing, and application-focused exercise (www.teambasedlearning.org) and conducted in a leadership and management course that included an NCLEX review component. TBL teams worked together for a 10-week period, and completed individual readiness tests (IRAT) and team readiness tests (TRAT) weekly. Test items and application case studies were drawn from Prioritization, Delegation, and Assignment (3rd Ed.) (LaCharity, Kumagai, &Bartz, 2014). In several sessions, role-play of charge nurse role was part of the application exercise.

Initial faculty and student perceptions were positive. Students engaged with the content and their different perspectives were noted. Faculty provided links to clinical examples from their practice and facilitated students sharing their rationale for divergent answers. In general, student feedback was positive for the relationships developed, the interactive nature of the approach, and the benefits of the strategy on collaboration. Future work is planned to more specifically quantify the outcomes both in relationship to the collaborative process and the NCLEX performance.

AN INVESTIGATION INTO EFFECTS OF ARTIFICIAL SUGAR IN MICE. *ALEXANDRA SELICO-DUNN* AND UDUAK AFANGIDEH, FAULKNER UNIVERSITY.

There is no doubt that obesity and other weight related diseases are a growing epidemic in America and in other first world countries. These are linked to the foods we consume; companies have been coming up with ways to help reverse that trend with sugar free food, drinks and sugar substitutes. According to (Sharma, A., Amarnath, S., Thulasimani, M., & Ramaswamy, S, 2016) ever since this change over to artificial sweeteners, there has been a rise in certain cancers and chronic diseases (p 237). Some people believe it has something to do with rising use of artificial sweeteners. The over usage of these sugars can cause some form of abnormal cells or genetic mutation to certain organs and the blood in the body. Thus this present research was undertaken to help further understand these artificial sugars; sucralose, aspartame, and acesulfame-K.

INTEGRATING INFORMATION LITERACY INTO HEALTH SCIENCES EDUCATION. *LAUREN YOUNG*, LANCE DAY AND LORI NORTHRUP, SAMFORD UNIVERSITY.

Employing principles from academic librarianship, medical librarianship, and previous clinical experience, faculty librarians at Samford University draw from diverse backgrounds and skill sets to equip undergraduate and graduate students in Samford University's College of Health Sciences (CHS) with the information literacy proficiencies they will need to navigate their research- and clinical-based academic programs and future careers.

The three librarians serving as liaisons to schools and programs within CHS will share specific measures they have taken to support their liaison student populations to include: Classroom-based instruction and orientations; in-person and distance reference services and research consultations; and the ongoing development and updating of online research guides and Samford-specific training videos.

This paper will feature a primer on the Association of College & Research Libraries' Framework for Information Literacy for Higher Education and a discussion of the Frames' relevance in the health sciences. Takeaways for participants will include strategies for integrating information literacy concepts into health sciences education and approaches for leveraging librarians at their institutions.

NURSING SELF-ASSESSMENT OF IPEC COMPETENCIES AFTER INTERPROFESSIONAL EDUCATION EXPERIENCES. *ELLEN BUCKNER*, SAMFORD UNIVERSITY. LISA GURLEY, ALABAMA A&M UNIVERSITY.

Interprofessional education has potential for strengthening interprofessional practice and improving the quality of healthcare. As we add these experiences to the curriculum it is important to be able to describe and measure the effects of educational innovations on the core competencies of shared values, communication, knowledge of roles and responsibilities, and the ability develop teamwork (IPEC, 2011).

The purpose of this project is to describe nursing students' self-assessment of their interprofessional education competencies before and after curriculum based interprofessional educational experiences. Several instruments were evaluated and for this preliminary study the one which was chosen has items related to each of the IPEC competencies. The survey has 16 items, with answers on a 5-point scale of strongly disagree to strongly agree (Dow, DiazGranados, Mazmanian & Retchin, 2014). Students received an email survey via Qualtrics. which allowed students to take the first 16 questions (pre-test), with the link resent at end of the term for the repeated last 16 questions (post-test) so responses could be matched.

Interprofessional experiences included a conference on collaboration in end-of-life care, a pharmacy-nursing case analysis discussion, and multi-disciplinary acute care simulation. Twenty-eight students from traditional (19) and accelerated second degree (9) BSN nursing programs completed both pre- and post-survey. Preliminary findings were that students increased in the ability to engage other health professionals in shared problem-solving, to apply leadership practices that support collaborative practice, and to engage other health

professionals to constructively manage disagreements. Further analysis of these data is planned.

TELEHEALTH SERVICES. *LAURA EDWARDS*, LAURA EDWARDS AND REBECCA HUIE, BIRMINGHAM VA MEDICAL CENTER.

Veterans have an easier access and greater choice to services, benefits, and care. 45% of Veterans reside in rural communities where distance and access to care can be a barrier to receiving care. Since 2002, the Veteran's Affairs (VA) has been providing clinical care and case management using telehealth technology to improve the Veteran's health. The use of clinical video telehealth, home telehealth, and store and forward telehealth offers access to care in circumstances where distance separates those providing care and those receiving care. Through the leverage of these technologies, about 12% of the total Veteran population received care through a telehealth modality in 2017. With advancements in these technologies and government regulations, the VA will enhance Veteran's care by integrating access to clinical care anywhere the Veteran is located irrespective of the Veteran's or the provider's location.

A QUALITATIVE STUDY OF NURSING AND PHARMACY STUDENT PERCEPTIONS OF AN INTERPROFESSIONAL PHARMACOKINETICS SIMULATION. *JENNIFER BEALL*, SAMFORD UNIVERSITY. CHERYL CROPP, MCWHORTER SCHOOL OF PHARMACY. FRANKIE WALLIS AND ELLEN BUCKNER, IDA MOFFETT SCHOOL OF NURSING.

One aspect of interprofessional practice between nurses and pharmacists involves pharmacokinetic dosing of medications in a hospital setting. This study applied the Interprofessional Education Collaborative (IPEC) Core Competencies (2011) of values, roles/responsibilities, communication, and teams/teamwork were applied to describe nursing and pharmacy students' initial perspectives following an IPE simulation applying pharmacokinetic concepts.

Methods: The investigators developed a simulation activity for senior undergraduate nursing and second-year pharmacy students. A total of 54 nursing and 91 pharmacy students participated in the simulation using medium-fidelity mannequins. Each case represented a pharmacokinetic dosing consult (vancomycin, tobramycin, phenytoin, theophylline, or lidocaine).

Nursing students completed head-to-toe assessment of the patient and pharmacy students began with a brief case vignette. Pharmacy students gathered necessary information from the nursing student as well as the chart and the calculated doses. Pharmacy students communicated the new dosing regimen (including administration and monitoring parameters) to the nursing students using SBAR (Situation, Background, Assessment, Recommendation). Nursing and pharmacy students both participated in the debrief session where each discipline identified their top priority problems related to the patient case identified during the simulation. Both groups completed an online survey approved as exempt by the IRB. Questions included: What did you learn today? What were your strengths/areas for improvement during this activity? What did

you learn about Interprofessional collaboration? Do you have any additional recommendations for improving the interprofessional education?

Results & Discussion: Seventy-seven of the respondents (64.7%) were pharmacy students while 42 respondents (35.3%) were nursing students. Themes from survey responses are being extracted. Few studies relate to this type of IPE and this study begins to explore student perceptions of IPE in a health sciences clinical context through simulation.

ON MISSION FOR MALARIA: AN EDUCATIONAL GUIDE. *SHERRI CHATMAN*, SAMFORD UNIVERSITY.

Transmission of malaria as a result of individual travel to areas where the disease is endemic can lead to a potential risk that the disease may re-emerge in the United States. CDC data indicate that approximately 1,700 malaria cases occur each year in the U.S as a result of international travelers and immigrants. Malaria is an infectious disease that continues to cause significant numbers of illnesses and deaths yearly. Travelers to endemic areas are at risk of contracting the disease and of transmitting the infection upon return to the United States. Young children are especially vulnerable as they may lack immunity to the disease. This presentation is a discussion of an educational guide that has been developed for individuals assigned to evangelical and healthcare related mission trips in malaria endemic areas. The educational guide includes information regarding pathophysiology, prevention, and treatment of malaria. Evaluation of participant's knowledge of malaria after completing the educational session is assessed using a pre-test and a post-test. The ultimate goal of this intervention is that the educational program will empower participants to educate others, especially those living in malaria endemic areas that are being served on mission trips.

EFFECTS OF 4% BLUEBERRY DIET ON ANXIETY AND ATAXIA IN A MOUSE MODEL OF RETT SYNDROME. *SUZANNE OBERHOLSTER* AND RON HUNSINGER, SAMFORD UNIVERSITY.

Blueberries contain polyphenols such as anthocyanins that are antioxidant and anti-inflammatory. Research shows that blueberries attenuate the inflammatory response of brain microglia, protect neurons from stroke-induced damage in rats and improve performance of rats on rod walking.

Most females with Rett syndrome have known *MECP2* (methyl CpG binding protein 2) mutations. Females with Rett syndrome have a myriad of symptoms including hyperventilation, anxiety, apraxia, hand stereotypies and regression in both speech and motor ability beginning at 6-12 months of age. Ataxia is a common problem in some girls and may contribute to an inability to walk at any age. The purpose of this study was to determine if a six week, 4% blueberry diet, in age matched WT and *Mecp2*-mutant heterozygous female mice would alleviate anxiety as measured by the open field test and improve ataxic parameters on the parallel rod test.

BLOCKCHAIN APPLICATIONS IN HEALTH: HYPE AND REALITY. *DAVID ROBBINS,* SAMFORD UNIVERSITY.

With the explosion of blockchain-based technology, driven in no small part by the astronomical valuations of cryptographic currencies such as Bitcoin, numerous applications in health care have been proposed. But do these applications solve real problems? What is a blockchain anyways? We summarize recent proposals and experiments in applying blockchain technologies to health informatics activities, separating the hype from the reality.

DIAGNOSTIC IMAGING OF LUNG DISEASE. *DONNA CLEVELAND,* UNIVERSITY OF SOUTH ALABAMA.

Diagnostic imaging of lung disease has undergone many changes since the first computed tomography (CT) unit was developed in 1971. CT is now part of daily practice in thoracic radiology and has reached a technological maturity. Computed radiography systems provide several advantages, including compensation for variations in exposure and thin millimeter slices of thoracic lesions. Diagnostic digital chest radiography still remains an important examination and should be done before special procedures are taken to answer specific questions. Routine chest radiography is still the most frequent method of imaging employed today. Radiographic chest studies can suggest airway pathologies such as atelectasis, endobronchial neoplasia, bronchiectasis and many other types of lung pathology, but CT provides a unique strategy for the localization and characterization of bronchial and pulmonary parenchymal disease. The most important role of CT is to determine, localize and characterize patterns within the pulmonary parenchyma, and correctly identify bronchiectasis and other lung complications. In lung cancer, imaging has an important role in accurate staging with regard to the correct selection of patients and evaluation of prognosis. CT is one of the major tests used for staging of lung disease. The role of Magnetic Resonance Imaging (MRI) with regard to lung cancer is not precisely determined. MRI can play a complementary role in the staging of lung cancer in cases of superior sulcus tumor; pericardial involvement, tumor extension in subcarinal regions and invasion of the superior vena cava. The radiologic detection of the solitary nodule is a difficult responsibility for the radiologist. CT provides the precise localization of the nodule and is reliable for analyzing radiologic features such as calcification, cavitation, and spiculated borders. The problem remains of the discovery of an incidental benign pulmonary nodule in the patient with an extrathoracic malignancy and often necessitates percutaneous biopsy under CT guidance. The evaluation of diffuse lung disease lies in pattern recognition. Chest radiography is the initial tool for diagnosis, but high-resolution CT (HRCT) can provide routine visualization of structures of less than 500 mu. HRCT can be useful in formulating a differential diagnosis with recognition of pattern and distribution of the disease.

AN ELECTROENCEPHALOGRAPHIC STUDY OF PHONOLOGICAL EFFECTS ON WORD RECOGNITION. *JOHN SHELLEY-TREMBLAY* AND DONALD KNAPP, UNIVERSITY OF SOUTH ALABAMA.

Recent research in visual word recognition has shown that phonological neighborhood density facilitates visual word recognition in a variety of tasks. The current research was designed to assess whether there is an electrophysiological marker for the phonological neighborhood effect. Participants made lexical decisions to words varying on phonological neighborhood while event-related potentials were recorded. The results replicate previous research by showing that words with many phonological neighbors were responded to more rapidly than were words with few phonological neighbors. However, the main contribution of the current research is that it shows an effect of phonological neighborhood on the N400 Event-related Potential. The nature of the effect was such that the N400 was larger to words with few neighbors than to words with many neighbors. The increased N400 for small neighborhood words is thought to reflect additional semantic processing that is required for these words due to delayed processing in the phonological system.

SEXUAL DIFFERENCES IN EFFECTS OF ILEAL INTERPOSITION SURGERY ON MELANOCORTIN-4 RECEPTOR DEFICIENT RATS.

***COURTNEY HUNT*, PING ZHAO AND COURTNEY HUNT, UNIVERSITY OF NORTH ALABAMA. ALICIA KIECHLER,ELLIOTT ZIEMAN AND APRIL STRADER, SOUTHERN ILLINOIS UNIVERSITY CARBONDALE.**

Purpose: We aimed to determine the metabolic differences between male and female rats after ileal interposition surgery, and determine whether the remission of insulin resistance after ileal interposition is dependent on melanocortin-4 Receptor signaling in both male and female rats.

Materials and Methods: Fifty-two age-matched male and female rats (different genotypes) were treated with either sham or ileal interposition surgery. Glucose tolerance tests and body composition analysis were then performed.

Results: Ileal interposition surgery improved glucose tolerance in male rats, but not in female rats; the surgery increased insulin sensitivity in both male and female rats independently of genotype and body weight; the surgery decreased both fat percentage and/or fat mass in female rats, not in male rats; and the surgery did no effect the lean percentage and/or mass in both male and female rats. Melanocortin-4 Receptor deficiency decreased the lean percentage in both male and female rats but increased lean mass in male rats only.

Conclusions: Melanocortin-4 Receptor signaling is not necessary for the underlying beneficial effects of ileal interposition on glucose metabolism and insulin resistance. Female Mc4r knockout rats, in the long term, could lose more fat mass and/or fat percentage than male after ileal interposition surgery; female might thus benefit more from bariatric surgery than male.

HEALTH SCIENCE POSTER ABSTRACTS

BUILDING PARTNERSHIPS: A COLLABORATIVE CASE OF US AND KENYAN STUDENTS. *SYLVIA WAWERU,* UNIVERSITY OF SOUTH ALABAMA.

Seven undergraduate and graduate nursing students made a huge difference in the lives of communities they engaged with when they traveled to Kenya as part of a service abroad project. While in Kenya, they visited orphanages, donated supplies, learned about the Kenyan healthcare system and made home visits alongside University of Nairobi (UON) students. The University of South Alabama(USA) and the University of Nairobi, Kenya have a Memorandum of Understanding to facilitate research collaboration, faculty and student exchanges among other things. This visit and working alongside UON students was the first product of the memorandum. Students from both colleges also made presentations on different aspects of healthcare during a two-day intercultural event that was hosted by both the USA College of Nursing and the UON College of Nursing Sciences. This service abroad program incorporated an academic component to allow students from both universities to interact and work together. The challenge of service abroad projects in the health sciences is the sustainability of interventions after students leave the communities. This student collaboration provided a follow up mechanism for health issues encountered and hence a more impactful intervention. At the end of the seven days, some students indicated that their perceptions of Kenya were either challenged or reaffirmed, others were impressed by certain elements of the health care system and country, whereas others indicated feeling moved to create solutions for issues encountered. This poster presentation will detail the partnership building activities that the USA and UON students undertook.

ALBUMIN SITE SPECIFIC PROTEIN BINDING OF BENZODIAZEPINES. *RACHEL STOGNER*, SERENA CLARK, GREGORY GORMAN, PH.D. AND PAMELA SIMS, PHARM.D., PH.D., SAMFORD UNIVERSITY.

Current literature states that in general, basic drugs bind to alpha-1 glycoprotein while acidic drugs favor albumin due to differences in pharmacological properties. Our previous research showed that benzodiazepines—weak bases—were binding significantly to albumin, which contradicts published literature. The primary objective of this study is to determine whether there are differences in albumin binding site preferences of benzodiazepines and if that plays a role in why these weak bases prefer albumin over alpha-1 glycoprotein. Protein binding can largely influence drug interactions and drug displacement in a clinical setting. Identifying albumin site specific binding tendencies of benzodiazepines could potentially allow practitioners to avoid these pharmacokinetic complications moving forward.

Albumin binding site preferences of six common benzodiazepines (lorazepam, clonazepam, diazepam, alprazolam, midazolam, and triazolam) were observed using warfarin sodium and diclofenac sodium as albumin site one and site two probes, respectively. Warfarin and diclofenac were tested separately with each of the six benzodiazepines in physiologic

concentrations of albumin at 40 mg/mL. Samples were incubated, transferred to centrifree filtration devices, and centrifuged. Filtrate was analyzed using liquid-chromatography mass spectrometry to obtain the percentage of free diclofenac or warfarin that each given benzodiazepine displaced from albumin.

Results showed the largest difference in site specific displacement with alprazolam, which displaced approximately twice as much diclofenac (site two) than warfarin (site one). The second largest displacement of diclofenac was seen with clonazepam and a minimal increase in diclofenac displacement was seen with diazepam. There was no significant difference between the displacement of diclofenac compared to that of warfarin by triazolam, midazolam, or lorazepam. These results indicate that alprazolam, clonazepam, and diazepam all show a slight binding preference for site two, while the remaining three drugs show no binding preference for one site over another. While there is evidence that benzodiazepines do bind significantly to albumin, our research concludes that albumin binding site preferences influence the overall protein binding of only certain benzodiazepines.

ANALYSIS OF HEALTH INSURANCE STATUS OF STUDENTS AT SAMFORD UNIVERSITY. *JAMOND GLASS* AND ASHLEY ROBERTSON, SAMFORD UNIVERSITY.

Here in the United States the lack of health insurance coverage has been a reoccurring issue in our health system. In 2017, an estimated 24.7 million U.S. citizens between the ages of 18 and 64 were uninsured (CDC, 2017). Often people encounter the choice between paying for health insurance or another necessity, with health insurance frequently put on the back-burner. There are various reasons individuals and families are not able to pay for health insurance, often causing them to forego care. In college the majority of full time students don't have a stable income to afford to pay for health insurance out of pocket. The purpose of this study is to see if Samford undergraduate students are going without basic healthcare due to uninsurance or underinsurance. To collect information for the study an online survey will be sent out to undergraduate students on Samford's campus asking basic information about their insurance status, access to healthcare, and descriptive demographics. The information collected can potentially raise awareness of uninsured students on college campuses and spark discussion as to change in the allocation of funding on college campuses as well.

SERVICE, KNOWLEDGE IN NURSE ANESTHESIA STUDENTS AFTER SERVICE LEARNING IMPLEMENTATION. *TERRI CAHOON* AND AMY SNOW, SAMFORD UNIVERSITY.

American Association of Nurse Anesthetists (AANA) core values promoting community service include: professionalism, compassion, diversity, and interprofessional collaboration. Nurse anesthesia students (SRNAs) are rarely exposed to underserved groups outside of the operating room. Service learning projects provide experiences that help students overcome negative stereotypes, heighten sensitivity and increase empathy. The project was to determine if implementation of service learning project (SLP) would increase knowledge and participation in community, professional, or health volunteerism in SRNAs. A quasi-

experimental control trial was completed using SRNAs. Group 1 consisted of freshman and junior classes who were exposed to the SLP, and Group 2 (Control) consisted of 22 senior students, who did not participate in the SLP. Prior to implementation, both groups took a knowledge/opinion pretest and Group 2 took an attitudes survey. Group 1 participated in SLP, including the requirement to complete 20 hours of service and completed the attitudes survey prior to graduation. Both groups completed the knowledge/opinion posttest and participation survey six months after graduation. Due to small group sizes, statistical analyses for both the knowledge/opinion survey and participation survey were unable to meet assumptions of chi-square statistic. However, post-graduation participation survey demonstrated increased percentages in Group 1 for service during school, opportunities since graduation, service in first six months, and plans for service. Mann-Whitney U analysis found no differences in service attitudes scale results between groups. The treatment group had increased percentage of service participation. The SLP has become a discriminator and characteristic of the nurse anesthesia educational program.

EVIDENCE-BASED PRACTICE SUPPORTING CURRENT CERVICAL CANCER SCREENING GUIDELINES. *REBECCA THOMAS* AND DAPHNE HUTTO, UNIVERSITY OF SOUTH ALABAMA.

Background: The Papanicolaou smear (Pap smear) became a standard of practice in the 1950s. Guidelines concerning the age of initiation and frequency of testing changed in 2012, as new evidence concerning the slow growth of cervical cancer emerged. With the need to implement these new guidelines shifting from solely a patient health perspective to one of insurance coverage, it is imperative that providers and patients understand the evidence-based rationales behind the new Pap smear guidelines.

Clinical Practice Guidelines: Pap smears and HPV testing are no longer recommended before the age of 21, regardless of sexual activity. Slow growing cancers or pre-cancer of the cervix is rare in women less than 20 years of age. HPV testing is not recommended in women less than 30 years of age. Approximately 90% of HPV infection in women and young girls spontaneously clears within 2 years. Women aged 21-65 should have a Pap smear every 3 years. Those aged 30-65 who may elect to have a Pap smear with HPV co-testing every 5 years. This is a change from the recommendation of yearly screening, due to the slow growth nature of cervical cancers. Women over the age of 65 with adequate prior screening and low risk for cervical cancer may discontinue screening. There is adequate evidence that screening this population provides little to no benefit. A vaginal cuff Pap smear is no longer recommended for those who are status-post total hysterectomy, unless the hysterectomy was done for cervical cancer or pre cancer.

ETHICAL ISSUES IN SOCIAL MEDIA: A STUDY OF FIRST SEMESTER AND LAST SEMESTER NURSING STUDENTS. *FRANCES CLARKE*, UNIVERSITY OF SOUTH ALABAMA. ELIZABETH VANDEWAA, COLLEGE OF NURSING. DAVID TURNIPSEED, COLLEGE OF BUSINESS.

Through advancing technology and increased availability, cell phones, social media, and all different forms of online communication are becoming the way of the world. Physicians and nurses walk into patient's rooms asking questions and typing comments, leaving the patient wondering if they, as a human, with emotions, feelings, and concerns, are being treated, or is a number on a chart being treated? The research question for this study is to determine if there is a correlation between social media use and the undergraduate nursing student's emotional intelligence and empathy between the first and last semester. Individuals have analyzed health care worker's emotional intelligence, and analyzing health care worker's social media use, but no significant research has been done directly comparing the two. This mixed descriptive study used a survey questionnaire involving questions regarding emotional intelligence, social media, and a brief demographic section. The survey was administered in the fall to a group of first semester nursing students and a group of last semester nursing students. Completion took approximately twelve minutes and surveys were collected when each participant was finished. All student responses were anonymous. Each answer correlated to a numerical value and was entered into a computer system for analysis. Preliminary results show that approximately 40% of students have received homework help from social media, and three of the most common social media sites used include Facebook, Instagram, and Snapchat.

PEDIATRIC HOSPICE CARE: THE EFFECTS OF AN EDUCATIONAL PROGRAM FOR PEDIATRIC HEMATOLOGY AND ONCOLOGY NURSES ON END-OF-LIFE SERVICES. *MADELINE ERICKSON* AND REBECCA THOMAS, UNIVERSITY OF SOUTH ALABAMA.

Purpose: The purpose of this study is to compare nursing staff attitudes and knowledge concerning pediatric hospice care before and after an informative educational program meant to detail each step of when and how to refer a pediatric patient into hospice.

Background: Hospice is a special concept of care designed to provide comfort and support to patients and their families when a life-limiting illness no longer responds to cure-oriented treatments. The overall goal of hospice care is to improve the quality of a patient's last days by offering comfort and dignity. Within the last couple of decades, pediatric hospice care was initiated as an essential service in end-of-life care of children; however, there are still many areas for improvement.

Methods: The design of this research is a single group quasi-experimental pre-test post-test design. The participants were surveyed using a modified version of the "Nursing Knowledge, Attitudes, and Behaviour Regarding Hospice Care" questionnaire before and after the hospice care education program to determine if there was an improvement in understanding and overall knowledge about hospice care and the referral process. The participants were then re-surveyed

three to eight weeks later to ascertain if the education program precipitated an increase in hospice care referral rates.

Results: Data collection is currently in progress. Expected results are that nurses demonstrate a better understanding and knowledge base regarding hospice care after the education program. The author also hypothesizes that there will be an increase in hospice care referral rates after the education program.

INDUSTRIAL DESIGN PARTICIPATION IN PROJECT MANAGEMENT.

RANDALL BARTLETT **AND CLARK LUNDELL, AUBURN UNIVERSITY.**

Team management often referred to in the past and recently as concurrent design/engineering and matrix management is now embracing this practice as a proven methodology. The main ingredient is that of empowerment given to the team to make decisions collectively, thus eliminating the total approval from the next level of management. The concept is based on the team making decisions in order to minimize delays and hopefully bring the product to the market fast

The role of an industrial designer is a key member that participates in the decision process. The industrial designer's role in team management is different from most other members in that they are dealing with an area that is often viewed as being subjective. Most businesses are not acutely aware of the importance of design. Industrial designers, viewed by peers and even other designers, are often considered to be just visual people and not actually concerned with practical elements. On the contrary, the industrial designer is very practical, their problem-solving methods and a holistic view is a tremendous asset in business today, especially in design thinking.

A psychological phenomenon to consider during Team Management is Groupthink, which occurs within a group of people where the results may be irrational or dysfunctional in the decision-making process. Group members try to avoid conflict in reaching a consensus decision, which often results in overlooking critical evaluation.

When critical evaluation of a possible solution is achieved the decision is often better. The synergy from the group propels even more effective decision-making. However, there is no method of decision-making that is not flawed

The industrial designer is an integral participant in the team management concept and is often the catalyst. This role will be discussed in terms of team management participation.

BIOETHICS AND HISTORY AND PHILOSOPHY OF SCIENCE PAPER ABSTRACTS

THE ROLE OF CREATIVITY IN SCIENCE. *SARAH MCGHEE* AND DENNIS SANSOM, SAMFORD UNIVERSITY.

Drawing on Nobel Prize laureate and polymath Herbert Simon's conception of creativity, this paper explores the role of creative thinking within scientific inquiry. Past philosophers of science, such as Robert Perry, Karl Popper, Imre Lakatos, Thomas Kuhn, and Paul Feyerabend, have formed contrasting definitions of science in their quests to distinguish science from pseudoscience. It is through careful consideration and comparison of these seminal scholars that the paper delineates five unique forms of scientific creativity. Recognizing these different forms of creativity in science is an essential step toward promoting progress and discovery in the scientific field. By embracing and encouraging alternate creative modalities, a student of science is granted the courage to question without fear, the mindfulness to experiment thoroughly, and the curiosity to explore where others have not yet imagined.

ENHANCING CASUAL LEARNING OF SCIENCE WITH GRAPHIC DESIGN. *DAVID SMITH*, AUBURN UNIVERSITY.

Should scientist be interested in casual learning when what they do requires a formal education and exacting adherence to research methods and documentation? The National Science Foundation seems to think so, as they are offering grants for the Advancement of Informal STEM Learning (AISL). A simple Internet search will reveal that there are many individuals and organizations interested in informal learning of scientific content. There are occasions when it is more effective to educate through casual learning means. This is usually driven by the desire to share scientific content with an audience that is not formally trained in scientific disciplines.

Casual learning is typically kick-started by a person's existing interest in a subject. Finding a connection between shared interests and using common language (limited scientific jargon) will make the content more accessible to an untrained audience. Utilizing graphic design to further enhance this educational experience can help open pathways to learning and retaining content, help clarify difficult concepts, and visualize complex information.

Three examples will demonstrate how graphic design was used as a tool to enhance the accessibility of scientific content for a non-scientific audience. First a print project sponsored by a local governmental institution, next a video based project sponsored by a university, and last an interactive self-initiated project.

THE SEARCH FOR KNOWLEDGE: A MATTER OF PERSPECTIVE AND TIME. *BRIAN LAHAIE*, UNIVERSITY OF GEORGIA, COLLEGE OF ENVIRONMENT AND DESIGN. CLARK LUNDELL, AUBURN UNIVERSITY.

Knowledge is a function of perception. We know based on our ability to know. Mankind is the measure of all things so says the Greek philosopher Protagoras. This paper presentation will explore examples of knowledge driven by sensory perception and perspective. From a simple beam of light to our furthest cast space satellite, we seek new perspectives and new vantage points to better understand our physical world and our place in it. Modern tools in medical technology allow us to see the human body in ways we had never imagined, until we imagined it. The classic children's book "Horton Hears a Who!" is paired with Steven Hawking's "A Brief History of Time" to express a light-hearted and hopeful view of that which is not quite visible, or perceptual. Science is our best hope for discovering meaning in a world which we have just begun to perceive.

THE TECHNOLOGICAL IMPERATIVE AND MEDICINE. *DENNIS SANSOM*, SAMFORD UNIVERSITY.

The success of technology in medicine has created a dilemma for its continual use and improvement. Technology has greatly improved medicine's diagnostic and therapeutic capabilities, but to do so, it has to objectify patients into organism that follow machine-like laws. The more technology succeeds, the more the patient's personal identity as a temporal, relational, and spiritual being is diminished. Furthermore, technology's success also creates an imperative to continue to use and improve it. The essence of technology is mastery and control over the present moment, regardless of final aims. However, it must be guided by ethical considerations. Preferential utilitarianism cannot provide this guidance, because it can only react to the results of technology; it cannot define an aim for these results. Also, because of its latent individualistic elitism, Kantianism cannot fully control the technological imperative. Medicine needs a teleological ethic that selects and uses technology to reach a human purpose greater than the successful use of technology.

GLOBAL MIGRATION: HISTORY, NECESSITY, ETHOS. *KENNETH NUSBAUM*, AUBURN UNIVERSITY. CLARK LUNDELL, AUBURN.

Since the Garden of Eden, people have been forced out of home and moved to places that seemed more favorable. Conditions of politics, economics, and environment have forced tens of millions of people to move across the planet with disruption of life patterns as migrants find a place to stay. While migrants generally produce favorable outcomes for individuals and nations, economic and social patterns may be changing. Discussion will address stopping migration, controlling migration, and paying for migration.

ECONOMIC CLIMATE AND CONTEMPORARY WATERS. *CLARK LUNDELL*, AUBURN UNIVERSITY.

The vitality of an economy drives the levels of consumption and aspiration of a society and is manifested in circumstantial systems and product outcomes. Often these systems and outcomes have unanticipated consequences. Design paradigms developed over the past 125 years reflect both the impact of the industrial revolution and its unintended outcomes.

This presentation will review four 20th century design personalities / theories / paradigms (The Bauhaus, Norman Bel Geddes, The Ulm School of Design, and Luigi Coloni) and identify unintended outcomes of these design philosophies. These outcomes present challenges to 21st century life that are manifest in worldwide Population (8 Billion), Alienation (Virtual Reality) and Pollution (Ocean Gyres).

The resolution of these challenges can be achieved by development of a paradigm that emphases an attitude of being aware of and existing in a present which reflects on the full consequence of our action upon the future.

BIOETHICS AND HISTORY AND PHILOSOPHY OF SCIENCE POSTER ABSTRACTS

METHOD FOR THE DEVELOPMENT OF ALTERNATIVE AGRICULTURE. *JUSTIN MURPHY*, AUBURN UNIVERSITY.

An exponentially increasing world population necessitates an increase in global food output. Meeting this demand using modern agricultural techniques will result in an increase in unsustainable practices known to be damaging to both humans and the environment. The importance of developing economically sound alternative agricultural models to mitigate these damages is therefore becoming increasingly important.

Aeorponics is an alternative agricultural model that uses a nutrient rich mist to grow plants in a controlled environment without the use of soil or an aggregate media. Research has demonstrated that aeroponic systems can increase crop yield with less water, less fertilizer, and no pesticides. Due to these promising implications, more research is needed to determine whether an aeroponic model could be a viable system for solving the alarming problems associated with safely increasing food production.

The paucity of research in applied environmental stressors to alternative agricultural models like aeroponics presents an opportunity for the discovery of fundamental knowledge that could be used in the development of economically viable risk mitigating agricultural models.

This researcher is conducting research on the effects of an induced environmental stressor in the form of sound waves on lettuce grown in a high-pressure aeroponic system. Data from previous studies demonstrating the positive effects of sound waves on field grown crops will be applied to this alternative model expecting comparable results. If successful, this experiment will result in a fully functioning prototype using acoustic technology to increase the efficiency of a high pressure-aeroponic system.

BIOETHICAL CONSEQUENCES AND IMPLICATIONS OF CRISPR-CAS9 TECHNOLOGY. *SHUNTELE BURNS*, ALABAMA STATE UNIVERSITY.

CRISPR-Cas9 is a gene-editing technique that has garnered much attention because of its relative speed, ease, and low cost. CRISPR stands for Clustered Regularly Interspaced Short Palindromic Repeats; Cas9 refers to the system's associated nuclease that cuts segments of DNA. CRISPR-Cas9 holds great promise for treating many diseases. However, this technology also gives rise to vexing ethical questions regarding its current and potential applications.

CRISPR-Cas9 is adapted from an endogenous bacterial defense system. A bacterium accrues pieces of DNA from invading viruses and stores them in its own genome as CRISPR arrays. The bacterium produces complementary RNA sequences from these CRISPR arrays and uses them to identify previous invaders. The recognition of a returning virus causes the Cas9

enzyme to cut the viral DNA, thereby disabling the virus. Researchers have discovered that this natural mechanism can be tailored to edit DNA of choice—e.g., the DNA of cancerous cells.

Despite the many conceivable benefits of CRISPR-Cas9, some of its possible applications raise serious ethical issues. For example, altering the genome of plant and animal pests may have unintended negative consequences for the overall environment. Another especially troubling ethical challenge involves germline manipulation in humans, which could lead to requests for "designer" children. Moreover, if germline editing is permitted, will it be available only to the wealthy? These and other ethical concerns need to be considered as we become increasingly aware of the benefits and potential dangers of gene editing.

Minutes of the Spring Executive Committee Meeting

MINUTES OF THE
ALABAMA ACADEMY OF SCIENCE
Executive Committee Meeting
Buckner Home
Samford University
March 14, 2018

Meeting was called to order at 7:49 p.m. by Ketia Shumaker. [Minutes on the Academy Website]

Attendees:

Ellen Buckner
Matthew Edwards
Cameron Gren
Drew Hataway
Larry Krannich
Akshaya Kumar
Ken Marion
Prakash Sharma
Ketia Shumaker
Brian Toone
Jack Shelley-Tremblay
Steve Watts
Ken Marion
Anne Currie
Brian Burnes
Donna Cleveland
Brad Bennett
Chris Stopera
Anthony Winchester
Sami Raut
Salah Elafandi
Bettina Riley
Mark Jones
Mel Blake

Cameron Gren moved to approve minutes. Matthew Edwards seconded. Minutes were approved.

Comments or additions to the Spring 2018 reports were sought.

Brian Toone Provided an update on the AAS Journal. The two issues from 2017 have been published online. The journal has the domain name AAS.org. The old journals will be pulled into the archive. The journal will be using an online, open journal format with a standardized system. This will help with continuity and the efforts to get the journal indexed.

The flash drive provided with the registration for the annual meeting contain flashdrives containing the 2017 issues of the journal.

Update Action Items From Fall 2017 Executive Committee Meeting

Action Item	Person Responsible	Due Date	Update 3/15/18
Modify 2018 Meeting Registration form and implement on Academy website	Larry Krannich and Jack Shelley-Tremblay	November 2017	Done
Include a portal on the Academy website for members to obtain an official membership card	Jack Shelley-Tremblay	November 2017	The confirmation emails that members receive will serve this purpose
Create a few @alabamaacademyofscience.org email addresses	Jack Shelley-Tremblay & Brian Toone	November 2017	Not needed. Removed from action items.
Include an opt-in portal on the Academy website for members to indicate their preference to receive a hard copy of the JAAS	Jack Shelley-Tremblay	November 2017	Done
Designate a Section VIII Chair and Vice-Chair	Ketia Shumaker and Drew Hataway	November 2017	Section VIII Chair, Stephen Schultze
ASO Search Committee identifies and recommends a candidate for ASO State Director	Drew Hataway, Brian Toone, & Jane Nall	December 2017	Done (See Agenda D-1)
Write By-Law Changes regarding the combination of the Development and Membership Committees and formation of the Committee on Science, Public Policy and Public Relations. Distribute to membership in Winter 2018.	Larry Krannich	January 2018	Done (See Agenda D-2)
Write a resolution commending Governor Kay Ivey for supporting ASIM	Brian Burnes	March 2018	Done (See Agenda C-15)
Creation of an AAS mini-grant program to fund small initiatives for STEM outreach	STEM section	Spring 2018	See below #1
Reconsider the role of the Development Committee	Larry Krannich and John McCall	Spring 2018	See Agenda D-2
Creation of a silent auction for the 2018	Ketia Shumaker and	2018 Annual	Done

meeting. Held in the afternoon through Sci-Mix. Items to be picked-up after the banquet	Bettina Riley	Meeting	
Slate of Nominees for Officers and Committees	Drew Hataway	2018 Annual Meeting	Done (See Agenda C-16)

1. Ketia Shumaker brought up the action item related to STEM education and outreach mini-grant program. Mel Blake addressed the idea to create a fundraising calendar that would be sold to fund a grant program. He has located a company that makes fundraising calendars that charges $5 per calendar if you order more than $100. This would raise $200-300 per year. The logistics of collecting the money and shipping calendars is an issue that needs discussion. A committee needs to be formed to award the grants. Each image would have a QR code that would link to a website about the research represented. Jack Shelley-Tremblay suggested that the payment could be handled through the website. The next step is soliciting photos from researchers. The calendar printing takes approx.. 4 weeks. Larry Krannich will handle distributing an email seeking photos to the membership.
2. The silent auction at the annual meeting will extend Thursday 8 AM – 3 PM.
3. Finance Committee: Ken Marion reported that funds are approximately constant for the last few years.
4. Drew Hataway moved to approve the Finance and Treasurer's reports. Nixon Mwebe seconded the motion. The motion passed.
5. Ellen Buckner made a request for a videographer to take pictures and video about the AAS at a cost of $5000. She does not wish this to be an action item tonight, but would like to open a conversation about this opportunity. Drew Hataway moved that this suggestion be forwarded to the public relations committee for consideration. Cameron Gren seconded the motion. The motion passed.
6. Steve Watts suggested that we collect more data about website visitation and usage.
7. Local Arrangements Committee Report: Ellen Buckner welcomed everyone to Samford University for the Spring 2018 AAS meetings, hosted by the College of Health Sciences. She provided specific information about the meeting logistics.
8. Ellen Buckner requests that the AAS be more vocal in challenging the current anti-science and anti-education trends in state and national government.
9. Drew Hataway brought up items related to the nominating committee: he is seeking a member for the Macon Scholarship Committee and past presidents who would be willing to serve on the Long Range Planning Committee. Drew Hataway moved that we accept the slate of nominations put forward by the Nominating Committee. Mark Jones seconded the nomination. The motion passed.
10. Brian Burnes addressed the three resolutions proposed by the Resolutions Committee. Drew Hataway moved to approve the resolutions and Brad Bennett seconded the motion. The motion passed.
11. There was no nominee this year for the Gardner award. Please contact Prakash Sharma with nominations for next year.

Old Business

12. ASO search committee report to replace Jane Nall D-1: Mary Lou Ewald has been identified as a candidate for the ASO Director. Charles Eick has been nominated as the state Tournament

Director. Drew Hataway moved that this slate of candidates be accepted. Ken Marion seconded the motion. The need for broad geographic representation around the state was discussed. Concerns have been raised that the directors are both at Auburn. No statewide call for nominations was put out to gather these nominations. They were based on recommendations by current ASO leadership. This position has been historically been difficult to fill because of the associated workload and the recommendation of previous leadership has been historically taken very seriously. Regional directors help to balance geographical representation around the state. The movement passed.

13. Nixon Mwebe suggested that the AAS consider intentionally reaching out to underrepresented geographical areas of the state.
14. Bylaw changes D-2: Proposal regarding the combination of the Development and Membership Committees was considered by the executive committee and the general membership, with no negative comments. The combination of the Committee on Science and Public Policy and the Committee on Public Relations to form of the Committee on Science, Public Policy and Public Relations was also considered by the executive committee and the general membership, with no negative comments. Larry Krannich moved to approve these bylaw changes and Ken Marion seconded the motion. The motion passed.

Action Items For
Spring 2018 Executive Committee Meeting

Action Item	Action Taken	
Approval of Minutes from Fall 2017 Executive Committee Meeting (See Agenda A))	Approved	
Approval of Treasurer's Report (See Agenda B-6)	Approved	
Approval of Finance Committee Report (See Agenda C-2)	Approved	
Approval of resolutions commending Governor Kay Ivey, thanking/commending Samford University, and thanking/commending Jane Nall. (See Agenda C-15)	Approved	
Approval of recommendation from ASO Search Committee (See Agenda, D-1)	Approved	
Approval of By-Law Changes regarding the combination of the Development and Membership Committees and formation of the Committee on Science, Public Policy and Public Relations. Distribute to membership in Winter 2018. No comments received other than approval. (See Agenda, D-2)	Approved	

Action Items from
Spring 2018 Executive Committee Meeting

Action Item	Person Responsible	Due Date
Hiring of videographer for development of videos to showcase the activities of the AAS.	Public Relations Committee (Brian Burnes)	Fall 2018
Distinguished Service and Outstanding Leadership Award.	The Long Range Planning Committee (Matthew Edwards)	Fall 2018

New Business

1. Include a portal on the Academy website for members to obtain an official membership card. Jack Shelley-Tremblay reported that the motivation behind this item was to ensure that state employees could be fully reimbursed for their attendance at a conference of a society in which they are a member. It is his understanding that the automatically generated receipt for membership will meet this need. Ketia Shumaker questioned whether we have an app for annual meetings, and Jack Shelley-Tremblay reported that he set one up for the 2017 meetings, but that downloads were limited to 200 people. Ketia suggested that membership cards might be incorporated into an app. Jack can explore whether an app designed for nonprofit membership is financially viable. An app may not be valid documentation for the purposes of reimbursement. This item will be struck from the action item list.
2. Create a few @alabamaacademyofscience.org email addresses: Jack Shelley-Tremblay reports that this is still in progress. No consensus was reached about what specific addresses should be created. Drew Hataway suggested that we strike this from our action items.
3. Matthew Edwards brought up the Distinguished Service and Outstanding Leadership Award. The Long Range Planning Committee will report on this in Fall 2018.
4. Steve Watts raised concerns about lack of participation. Numbers of talks and posters in the Biological Sciences section are low compared to historical numbers. Anecdotally, faculty and students at UAB report that cost is prohibitive.
    a. Ellen Buckner suggested recruiting other organization who might like to combine meetings with AAS.
    b. Jack Shelley-Tremblay suggested that the key to increasing participation is to make sure that the journal is indexed so that the conference proceedings have an impact factor and count for promotion and tenure.
    c. Suggestions were made about generating an endowment to help supplement

registration fees.

d. Suggestions were made that individuals at each institution be recruited to represent AAS and encourage participation.

5. The meeting adjourned at 9:42.

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:

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- 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.