



UNDERGRADUATE RESEARCH SYMPOSIUM

May 2<sup>nd</sup>, 2014

10 AM - 1 PM

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## **ABSTRACT BOOKLET CREDITS**

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## **THE ABSTRACTS**

*This Symposium includes 80 presentations featuring the work of 185 students, mentored by 41 Faculty across 15 departments. The projects presented at this Symposium took place in 2013 and 2014 and include coursework and independent study activities. Abstracts are organized alphabetically by department and by project title. The Presentation number in parentheses following the title refers to the locations of the Poster and/or Physical Displays in the ARMAH. Oral presentations are scheduled in Lane Center 111 and 113. A map of the ARMAH and a schedule for the oral presentations will be available at the Registration Table. Each presentation also includes the following information:*

### **Project Title (Poster, Physical Display, Oral Presentation, Display #)**

*Name(s) of student(s)*

*Name(s) of faculty mentor(s)*

## **DEPARTMENT OF BIOLOGY**

### **Absence of Organized Lymphoid Tissues in the Intestine of the Freshwater Fish, *C. commersonii* (Poster 1)**

*Jennifer Kleponis, Andrea Keefer  
Dr. Rebekah Taylor*

Microscopic organized lymphoid tissues in the small intestine, such as cryptopatches (CP) and isolated lymphoid follicles (ILF), have been well characterized in the laboratory mouse. Descriptions of these structures have also been reported in rat and human, but the presence or absence of CP and ILF in other animals has not been explored. Given the evolutionary development of the adaptive immune system beginning in jawed fish, we hypothesized that CP and ILF would be present in the intestines of fish. We examined the intestines of 10 wild-caught *Catostomus commersonii*, a bottom-feeding freshwater fish found in local streams in Western Maryland and throughout the United States. The intestines of these fish were opened longitudinally and arranged in flattened layers for horizontal sectioning. Samples of mouse small intestine were prepared simultaneously as a positive control. After quick-freezing and sectioning, the tissue was stained with hematoxylin and eosin. Interestingly, a complete absence of organized lymphoid tissue was noted, suggesting that CP and ILF, in addition to the well-known Peyer's patches, are limited to higher-order animals and potentially only mammals. Plans to study other fish species, especially carnivorous varieties (since the composition of the intestinal immune system can change in response to diet) are currently underway to further support this finding.

## **Allyl Isothiocyanate (AITC) against *Rhizopus stolonifer* (Poster 2)**

*Alison Reinhardt*

*Dr. Hongqi Li*

AITC is the primary cause for *Alliaria petiolata* producing an allelopathy effect on neighboring plants. While there are two chemicals that are noted for the disruption in the association of mycorrhizal, AITC has been noted to cause the disruption. AITC can disrupt the beneficial relationship of mycorrhizal fungi (AMF) that is associated with the plant roots which limits their soil radius for uptake. Testing the strength of this idea was used by blending garlic mustard plants and making a solution that was able to be sprayed. Having one piece or a few pieces of bread that had mold on it in the center with four pieces of bread around it with two sprayed with the garlic mustard and two with just water. This is a simple way without much depth to see if the chemical can have any effect on the mold transformation onto a new piece of bread. This process was done a total of three times. Each time took about a week, and before that took about two weeks to get the procedure right. The first set of results was positive towards the stated hypothesis. The second and third did as well. The two sprayed with the allyl isothiocyanate chemical in the garlic mustard showed no results of transferred spores or any form of activity from the *Rhizopus stolonifer*. The allyl isothiocyanate responded to the *Rhizopus stolonifer* the way that was predicted. The symbiotic relationship between the roots and mycorrhizal of 85% plants does not exist for garlic mustard because of the allyl isothiocyanate. This same result applies to other relationships as well and will continued to be explored.

## **A Case Study: Educational Benefits of LEGO in Learning Anatomy & Physiology (Poster 3)**

*Michelle Staton, Folajimi Fadahunsi, Serge Owoukor  
Dr. Willson Kwok*

Studies have shown that LEGO and brick-building can benefit students in cognitive, linguistic, physical, social and emotional developments. In this study the educational benefits of brick-building in learning Anatomy & Physiology was examined. Using bricks with different colors, sizes and shapes, students will be able to build models that highlight various anatomical features. Although there is no correct way to construct with simple blocks, there is indeed a correct way of assembling a skull or rib cage. Hence, the complicated block-building techniques used to build the anatomical models are similar to puzzles and may require a degree of convergent problem solving (Pepler & Ross, 1981). In this case study, educational benefits of LEGO were assessed by instructing students to build skull models with LEGO bricks and teaching students to use these models to learn the anatomical structures.

## **A Report on the Prevalence and Effects of Lyme Disease (Poster 4)**

*Gillian Hasslinger*

*Dr. Karen Keller*

Lyme disease is a zoonotic disease that develops from the transfer of a bacterial spirochete known as *Borrelia burgdorferi* from the bite of a deer tick called *Ixodes scapularis* to a host. The prevalence of the disease has increased dramatically over the past three decades in the Northeastern and Midwestern regions of the US, and develops in humans and companion animals. Development of the disease is categorized into three stages: early localized; early disseminated; and late disseminated. The early localized stage is characterized by the classical *erythema migrans* rash, resembling a bulls-eye. The early disseminated stage includes joint, heart, brain, and nerve effects, and additional rashes. The late disseminated stage includes arthritis as well as damages to nerves, the brain, and spinal cord. Because Lyme disease symptoms are often not present until the late disseminated stage, diagnosis is difficult. A two-step test is administered to test for Lyme disease, and includes an ELISA test, that, if results as positive, is followed by Western blotting. Antibiotics are used to clinically treat Lyme disease, specifically penicillins, cephalosporins, macrolides, and tetracyclines. Although human vaccinations have been recalled from the market at present, measures are being taken to prevent the risk of developing Lyme disease and prophylactic treatments are being prescribed more frequently.

## **Determination of Antimicrobial Activity of Two Black Cohosh Secondary Metabolites (Poster 5)**

*Maci Quintanilla*

*Dr. David Puthoff*

Black cohosh is a traditional and modern herbal remedy for several conditions with most modern use being for the treatment of menopausal symptoms. While humans have commandeered its use, Black cohosh uses secondary metabolites for uses unknown. Two molecules that have been previously implicated in Black cohosh's usefulness are actein and deoxyactein. These molecules will be used in anti-microbial assays to determine if they help protect the plant from invading pathogens. The assays will follow Kirby-Bauer protocols for diffusion in agar plates. Both actein and deoxyactein will be tested at multiple concentrations against *E. coli* and *A. tumefaciens*. Results will be compared to standard antibiotics (ampicillin, kanamycin).

## **Does Hybridization Contribute to Invasiveness? A Test with Two Introduced Silene Species (Poster 6)**

*Katy Limpert, Regina Trott, Stephen Keller*  
*Dr. Frank K. Ammer*

Invasive species harm ecosystems by displacing native organisms and altering natural processes. Some invasive species have been observed to spread into environments that are outside of the niche the species occupies in its native range, suggesting that evolutionary changes may be contributing to expanding the niche breadth of invasive species and allowing them to spread. This study focuses on *Silene vulgaris* and *Silene ceserii*, two related European weeds that have been invading North America for over 200 years. The objective of this research was to determine the genetic relationship between *S. vulgaris* and *S. ceserii*, and if hybridization between them during invasion may increase the expansion of these invasive species into drier regions of the United States by evolutionary processes selecting for drought resistant traits. Samples of these species were collected from the field and from herbariums across the United States for genetic analysis. In addition, *S. vulgaris* and *S. ceserii* were experimentally cross pollinated to determine if hybridization is possible between the two species. Potential hybrids, *S. vulgaris*, and *S. ceserii* were then grown under drought vs. well-watered (control) conditions in the greenhouse and measured for biomass. The results show that *S. vulgaris* and *S. ceserii* are genetically distinct but close relatives, with some indications that hybridization may be occurring in North America. Overall, hybrids attained high biomass, similar to *S. ceserii* but significantly higher than *S. vulgaris*. The effect of experimental drought reduced plant growth across both species and their hybrids, but the tolerance of drought stress was highest in pure *S. vulgaris*, expectations that the hybrids might benefit from increased drought resistance. Our results show that hybridization between co-invading weedy plants may have significant effects on the growth of invasive plants, but that in the case of *Silene*, hybridization does not appear necessary for invasion into drier sites.

## **Effects of the Hessian Fly Responsive Gene on Tobacco Hornworm Development (Poster 7)**

*Samuel Blum*

*Dr. David Puthoff*

Insect pests are becoming an ever increasing problem in food production, especially as world populations continue to grow. One way to combat these insects would be to engineer plants to resist those using genes from various species. Transgenic tomato plants were engineered using 1 of 3 genes from wheat and used in experiments to see if they are more or less resistant to a Tobacco Horn Worm. Caterpillars that fed on plants with the Hfr-1 gene did have a significantly higher mortality rate. In addition, plants containing Hfr-1 or Hfr-3 inhibited caterpillar growth during the later stages of development. These results indicate that plant genes from various species of plants can be used to engineer plants that are more resistant to insect damage, thus providing more food for growing world populations.

## **Establishment of White Oak, *Quercus alba*, Seedlings for Cherokee Basketry Material (Poster 8)**

*Kerry Messick, Megan Carr, Michael McCampbell (Graduate student), Matthew Tillett (graduate student)*

*Ami Sharp and Scott Schlarbaum, University of Tennessee*

*Dr. Sunshine Brosi*

Cherokee basketry depends upon availability of material from straight-grained white oak, *Quercus alba* L., trees. Experimental plantations were established on the Kituwah site in cooperation with the Eastern Band of Cherokee Nation. Over 300 seedlings were planted to study interactions among seedling quality, genetics, and the size of plastic tree shelter tubes (1.5, 1.8, 2.3, 3m), to determine the combination producing the most optimal material for basketry. Pedigree was maintained to quantify genetic components of growth and interaction with shelters and site. After eight years survival was 74%, and seedlings averaged over 4m tall and 71mm in basal diameter. Four year survival by shelter size showed no significant effect of shelter size on survival ( $p>0.05$ ) however after eight years survival was negatively related to increasing tree shelter size ( $p<0.001$ ). We recommend 1.5m shelters for optimal survival & growth. Results will aid in future determining establishment protocols specifically for basketry materials.

## **Herbarium Revamp: Sorting, Displaying, and Digitizing the FSU Herbarium Collection (Poster 9)**

*Alex Cathcart, Hannah Goodmuth, Ruth LaCourse, Joseph Linsalata  
Dr. Sunshine Brosi*

This project reorganizes the FSU Herbarium according to APG III guidelines to improve ease of access for students and researchers. Unmounted specimens will be properly prepared, topical collections will be made within the Herbarium, and the Online Herbarium will continue to be developed and updated.

## **Histological and Immunohistochemical Staining and Analysis of Serotonin Receptors in Frog Liver and Rat Brain (Poster 10)**

*Abena Abu, Brodie Witt, Cheyenne Snyder  
Dr. Karen Keller*

The purpose of this study was to section and stain different tissues and evaluate each for the presence of serotonin receptors. Rat cerebrum and cerebellum and frog liver were sectioned, treated with anti-serotonin receptor antibody and counter-stained with hematoxylin and eosin. Several cell types, including Purkinje cells, neurons and glial cells in the brain sections and hepatocytes and sinusoidal lining cells in the liver, were easily identified; however, only the cerebrum stained positively for serotonin receptors. Further studies using different dilutions of the anti-serotonin receptor primary antibody should be conducted to determine if the rat cerebellum and frog liver do contain serotonin receptors that were not detected using the dilution in this study.

## **Identification of Cryptopatches in the Small Intestine of Wild Mice (*Peromyscus* sp.) (Poster 11)**

*Russia Tatum, Fernando Terrero*  
*Dr. Rebekah Taylor*

The internal surface of the small intestine has a very large surface area that is in direct contact with the outside world via ingestion of food, microbes, and allergens. The intestinal immune system has developed multiple strategies to maintain homeostasis despite the continual presence of “non-self” materials in this anatomical location. Examples of unique immune components of the intestine are cryptopatches (CP) and isolated lymphoid follicles (ILF). CP and ILF are microscopic organized lymphoid tissues that develop in adulthood in response to changes in diet, stress, and inflammatory status. While these structures have been characterized extensively in laboratory mice, little is known about the status of CP and ILF in wild species. Thus, we have examined the small intestines of 10 wild-caught *Peromyscus* species of mouse and analyzed the tissue histologically to determine the CP/ILF load in these animals in comparison to conventionally housed lab mice. We found many examples of CP and ILF in each of the wild mice and we see evidence that CP and ILF density may be affected by parasitic burden.

## **Identification of Gastrointestinal Parasite Species from *Peromyscus* sp. from Allegany County, Maryland (Poster 12)**

*Courtney Strubin, Phylcia Nlend*  
*Dr. Karen Keller*

Studies suggest that tapeworms and nematodes are the most common gastrointestinal parasites of *Peromyscus* sp. of mice. The current study was conducted to determine if there were any endoparasites present in the stomach and intestine of *Peromyscus* sp. collected in Allegany County, Maryland in fall 2013. Stomach and intestinal contents from 8 previously dissected mice were examined for evidence of parasitic infection. Two mice (25%) were found to have endoparasites. Adult tapeworms and possible tapeworm and nematode (hookworm) eggs were observed. The tapeworms were tentatively identified as belonging to the group Mesocestoides.

### **Increasing Availability of Butternut for Traditional Cherokee Dye: Study of Native Permaculture and Companion Planting of Temperate East Appalachia (Poster 13)**

*Sedia Ngofa, Juliana Hong*

*Dr. Sunshine Brosi*

The bark, roots, and seed hull of the butternut, *Juglans cinerea* L., have been used for generations by members of the Eastern Band of the Cherokee Nation as a dye to create striking patterns in woven rivercane baskets. Butternut is impacted by an exotic canker disease causing the decline of nearly 80% of the trees in North Carolina. Efforts have been made to increase the availability of butternut material for dye. In collaboration with The University of Tennessee, a cultural resource planting was established at the Kituwah site with over 300 seedlings in 2006 from 5 genetic families. A butternut orchard was also established at Holmes Educational State Forest with over 200 seedlings from 8 genetically families. Students from Frostburg State University collected eight year results on the planting establishment. The goal of this project is to insure a sustainable supply of butternut for ecological and cultural uses.

### **Infertility: Regulation of the Uterus and Menstrual Cycle by Nitric Oxide Synthase and Superoxide Dismutase (Poster 14)**

*Cassie Murphy*

*Dr. Willson Kwok*

Infertility is the inability of a woman to get pregnant after at least one year of trying. It is also the inability to keep the baby after it is conceived. Infertility in a woman can be the result of physical problems, hormonal problems, and environmental factors. The most common case of infertility is the lack of egg production. There are several treatment options for infertile women; a few treatment options are as follows: tubal ligation reversal, tubal cannulation, fertility drugs, laparoscopic surgery and endometriosis, artificial insemination, and in vitro fertilization. Research has been completed that shows nitric oxide levels are tightly regulated by nitric oxide synthase (NOS) and superoxide dismutase (SOD1) which are controlled by estrogen during the period of the "window of implantation". The presence of multiple isoforms of nitric oxide synthase (NOS) in the epithelial cells as well as the stroma during the uterine cycle suggests that nitric oxide is required for normal function of the uterus and does not simply regulate vascular reactivity.

## **Influenza Genome Sequencing by RT-PCR Mass Spectrometry (Poster 15)**

*Bhagawati Phuyel*

*Dr. Willson Kwok*

Timely identification of the microorganisms that cause respiratory illnesses can greatly enhance patient's treatment and outcomes. Tripler Army Medical Center (TAMC) and Science Applications International Corporation (SAIC) have recently collaborated to establish a new disease surveillance technology in the Pacific Regional Medical Command to accomplish this goal. The tested system known as PLEX-ID can constantly provide surveillance and new information to healthcare officials in order to respond to any new outbreaks and to design new vaccines for emerging epidemics. Previously we have screened hundreds of samples from the medical center, and the system quickly identified the types of viruses that the patients' were infected with based on the thousands of genetic signatures stored on the system's database. Through our screenings, the PLEX-ID has identified seven influenza samples as unique since there were no completely matching genetic signatures in the database for these samples. Because these specimens may have geographical significance that may impact the vaccination strategy in the state of Hawai'i, we have fully sequenced the genome of these specimens. Since the PLEX-ID only sequences specific regions of the genome, we will evaluate the efficacy of the system by comparing the genetic signatures provided by the PLEX-ID and the results from the sequencing of the complete influenza genomes of the seven specimens.

## **Molecular Gender Determination in Birds (Poster 16)**

*Seth Stine*

*Dr. Frank K. Ammer*

The correct assignment of gender in many bird species is difficult especially those species with no sexually dimorphic or behavioral traits. Genetic testing can provide a simple cost efficient solution to this problem. There are specific conserved intron sequences of differing lengths located in genes on the Z and W chromosomes of avian species; length of the introns on the Z chromosome are different from the length of the introns on the W chromosome. These intron sequences can be isolated and amplified through Polymerase Chain Reaction (PCR) using specific primer sets. Once amplified, PCR products are examined on a 2.0% agarose gel that separates the introns into bands according to size and charge. The different banding patterns that arise can be used to accurately determine gender. There are multiple different sets of PCR primers that amplify several different intron sequences on the Z and W chromosomes. There have been claims that these primer sets are able to universally sex avian species. Through extensive trial these claims have been disputed and the avian species which they are able to sex are not all known. The goal of this experiment is to determine which PCR primers (2550/2718 CHD primers and P2/P8 CHD primers) worked best for specific avian species. Multiple tests have been conducted on the 2550/2718 primers, however testing using P2/P8 CHD primers still needs to be conducted.

## **Optimizing DNA Isolations for Wisconsin Fast Plants (Poster 17)**

*Andrew Doyle*  
*Dr. David Puthoff*

Wisconsin Fast plants are a staple in introductory Biology classes. However, molecular techniques can be expensive with any organism. This project will try to optimize the isolation of DNA from WFP will still keeping the reagents and equipment inexpensive.

## **Photographic Identification of Great White Sharks in Mossel Bay, South Africa and South African Conservation Efforts (Poster 18)**

*Brandon Foor*  
*Dr. Karen Keller*

Oceans Research Organization has been an active player on shark, particularly white shark, research and conservation efforts over the last six years. Oceans not only allows students from the local universities a prime location to conduct marine research projects, but they also offer amazing experiences and opportunities for interns from all over the world. One ongoing project that has been instrumental in educating people about white sharks is the photo ID project. This project involves photographing dorsal fins of white sharks at close range to identify individuals based on distinguishing characteristics such as pigmentations and scars, and tagging some sharks to collect tracking data. Results from these studies can be used to estimate population dynamics and chart migration patterns. While their primary focus began with marine research, Oceans is now conducting research and conservation projects on terrestrial animals as well as hosting internships in wildlife photography and documentary that raise awareness about South Africa and conservation efforts of its wildlife.

## **Review: Bone Graft Substitutes (Poster 19)**

*Jennifer Edokpayi*

*Dr. Willson Kwok*

The market for bone graft substitutes is about \$1.8 billion annually, with more than 700,000 bone grafting procedures performed annually in the United States alone. This market also grows at about 13% per year. Because these numbers easily exceed the number of available musculoskeletal donors, the discrepancy in the supply and demand of bone allografts has stimulated the development and sales of bone graft substitutes in the U.S. and in Europe. The successful performance of bone graft substitutes depends on their ability to facilitate new bone formation through three biological processes: osteoconduction, osteoinduction, and osteogenesis. This project aims to review the currently available bone graft substitute materials in this market, including (1) cellular allogeneic bone graft, (2) cancellous chips, (3) cancellous cubes, (4) DBM powder, (5) DBM foam, (6) DBM putty, (7) calcium phosphate bone void filler, (8) allograft paste, and (9) BioSet.

## **Rivercane as a Companion for Cultural Resource Butternut Plantings (Poster 20)**

*Gabriel Echeverri, Ian Cheek*

*Dr. Sunshine Brosi*

The Eastern Band of the Cherokee Nation use rivercane, *Arundinaria gigantea* (Walter) Muhl., for a variety of culturally significant applications including baskets, arrow shafts, wattle and daub building, mats, blow-guns, and flutes. Overgrazing, development of lowlands and invasive species have all led to the decline of rivercane for Cherokee artisans. Rivercane is also a sister or companion plant with butternut, *J. cinerea* L., a tree species also facing declines. This project will present eight year results collected by students from Frostburg State University of planting butternuts within an established cane stand and at a control site. In 2006 over 350 butternut seedlings were planted at the Kituwah site to determine the impact of rivercane on seedling establishment in conjunction with the University of Tennessee and RTCAR (Revitalization of Traditional Cherokee Artisan Resources). This project will guide future plantings of butternut to determine the feasibility of establishment within existing rivercane stands.

## **Stem Cells in a Nanoscale Synthetic Bone Graft Substitute (Poster 21)**

*Alexa Sivic, Tahlia Abuto-Estrada  
Dr. Willson Kwok*

It is estimated that more than 700,000 bone grafting procedures are performed annually in the United States, with a growth of 13% per year and with about half of these procedures related to spinal fusion. Since these numbers easily exceed the number of available musculoskeletal donors, the discrepancy in the supply and demand of bone allografts has stimulated the development and sales of bone graft substitutes in the U.S. Our first aim is to review the currently available bone graft substitute materials in this \$1.8 billion industry, including (1) allograft-based bone graft substitutes, (2) growth factor-based bone graft substitutes, (3) recombinant bone morphogenetic proteins, (4) ceramic-based bone graft substitutes, (5) polymer-based bone graft substitutes, and (6) cell-based bone graft substitutes. The successful performance of bone graft substitutes depends on their ability to facilitate new bone formation through three biological processes: osteoconduction, osteoinduction, and osteogenesis. For instance, growth factor-based bone graft substitutes such as bone morphogenetic proteins (BMPs) induces previously undifferentiated stem cells, but their applications have been limited by the requirement for a superior tissue scaffold or delivery carrier. Our second aim is to unveil our latest development of a new bone graft substitute that will satisfy all these three biological requirements for successful new bone formation. The *in vitro* effects of this new bone graft substitute, which contains (1) an osteoconductive carrier containing denatured collagen and nanoscale hydroxyapatite, (2) an osteoinductive agent involving demineralized bone matrix (DBM), and (3) an osteogenic component using mesenchymal stem cells (MSCs) were evaluated.

## **The Effect of Riparian Disturbance on Summer Diets and Condition of Brook Trout (*Salvelinus fontinalis*) (Poster 22)**

*Kendyl Hassler, Stephen Kaltwasser, Andrew Shadel, Evan Vaeth  
Dr. Jered Studinski*

Human activities have caused brook trout populations to decrease across most of their range. Brook trout, the only native salmonid in central Appalachia, are an integral part of stream ecology and an important source of tourism revenue. Understanding how disturbance affects brook trout populations is important; however, data are lacking, especially regarding age-0 (young-of-year) brook trout. This study used a non-lethal method to examine how severe riparian disturbance affects the diet and condition of age-0 brook trout. Age-0 brook trout were sampled from two forested streams in eastern West Virginia during June, July, August, and September 2010. Within each stream, samples were collected from a natural, reference section and from a heavily disturbed section. Stomach contents were evacuated and collected using a novel gastric lavage method. Prey items were measured and identified to family during spring 2014. Similar to studies focusing on adult brook trout diets, terrestrial invertebrates were found to be important to age-0 brook trout. Brook trout diet composition shifted towards aquatic taxa in the stream sections with disturbed riparian areas. Additionally, brook trout in these disturbed sections may have benefitted from increased stream productivity by having fuller stomachs and significantly better condition. This study provides novel insights into the response of age-0 brook trout to riparian disturbance.

## **Wildlife in South Africa (Poster 23)**

*Kendyl Hassler*

*Dr. Rebekah Taylor*

Located in Maroelasfontein, Limpopo South Africa, Gitta-Martula Wildlife Rehabilitation Centre is a state-of-the-art center with inside holding cages, outside enclosures and bomas. The rehab center is situated on Tholo-Beze Lodge, a 200ha game farm where bird life is abundant and game is extremely visible. A three week stay includes assisting at Gitta-Martula WRC, Tholo-Beze Lodge and Korro Predators. While at Gitta-Martula WRC, you will take part in routine feeding, cleaning and maintenance as well as assist in the capture, transport and release of wild animals. Though the animals are minimally handled, you will help with mental stimulation and enclosure re-vamping. When working with Tholo-Beze Lodge and Korro Predators, you will learn the native flora and fauna, assist with game counts and assist in meal preparation, training and stimulation for the four on site lions (from outside of the lion camp). The price for the minimum three-week stay is \$1300. This includes accommodations, transportation to and from the airport, 3 meals a day, and a trip to Sun City and either Pilansberg or Marakele National Park. Airfare and insurance are not included.

## **DEPARTMENT OF CHEMISTRY**

### **Adapting the Synthesis of Picazoplatin for a Undergraduate Research Methods Class (Poster 24)**

*Ryley McBride*  
*Dr. Jerald Simon*

The suitability of adapting the experiment presented in the Journal of the American Chemical Society, 135, 11680 2014, for use as a multi-part semester long project for an undergraduate research methods class was investigated.

### **Analysis of Stream Water at Frostburg State University: Assessing Acid Mine Drainage in Sandspring Run (Poster 25)**

*Nicholas Green*  
*Dr. Benjamin Norris*

Acid mine drainage can occur when pyrite ( $\text{FeS}_2$ ) exposed by mining reacts with water to form sulfuric acid and ferrous hydroxide. The sulfuric acid leaches various heavy metals from the rocks during the mining process. These metals, along with the acid, can contaminate local water sources. Water from Sandspring run behind Cambridge Hall was collected on several dates and analyzed. Acidity was determined by titration. Iron levels were determined using atomic absorption spectroscopy. Inductively-coupled plasma atomic emission spectroscopy was used to detect other metal contaminants.

## **Antioxidant Capacity of Black Cohosh (Poster 26)**

*Hussaine Hassan*

*Dr. Peggy Biser*

The purpose of this project was to quantify the effective anti-oxidant capacity of native populations of black cohosh through comparison of known antioxidants.

## **Baby Got DHA: Determining DHA Levels in Baby Formula (Poster 27)**

*Troy Knippenberg, Grace Weisenmiller*

*Dr. Benjamin Norris*

DHA (docosahexenoic acid) is a supposed essential nutrient that manufacturers of baby formula have been marketing as a key component. DHA plays a key role in the development of the nervous system. DHA will be isolated from four brands of baby formula (Enfamil Premium Infant, Gerber Good Start Protect, Parent's Choice Advantage, Similac Advanced) by conversion to the methyl ester and extraction into hexane. Gas chromatography-mass spectrometry will be used to quantify the level of DHA in each brand of formula.

## **Comparison of the Binding of Triarylmethane Dyes to Bovine Serum Albumin (Poster 28)**

*Erin Benton, Rachel Clark, Jacob Class, Matthew Ellison, Hussaine Hassan, Jacqueline Ipina, Andrea Keefer, Emmett Kitchen, Merri Nelms, Anthony Russo, Seth Stine*

*Dr. Peggy Biser*

The binding of four different triarylmethane dyes to Bovine Serum Albumin will be measured and compared for the number of binding sites and the  $K_d$ .

## **Evaluating the Scope of Aldol Condensations in Deep Eutectic Solvents (Poster 29)**

*Erin Benton, Matthew Ellison  
Dr. Benjamin Norris*

Deep eutectic solvent (DES) mixtures containing choline chloride and other biorenewable compounds have been examined as potential replacements for petrochemical-derived solvents. Choline chloride forms low melting mixtures with hydrogen bond donors like urea, isosorbide, and proline with solvent properties similar to ionic liquids. Aldol condensations between 3-pentanone and aromatic aldehydes produced 1-aryl-2-methylpent-1-en-3-ones in moderate to excellent yields as confirmed by gas chromatography-mass spectrometry.

## **Frostburg Grows Soil Analysis (Poster and Physical Display 30)**

*Samuel Blum, Marlene Michel  
Dr. Matthew Crawford*

The purpose of this study was to analyze the quality of various soil samples from the Frostburg State University campus area. This study determined that amounts of various metals in these samples using atomic absorbance spectrometry. The samples were tested for calcium, magnesium, manganese, potassium, copper, and zinc. A series of calibration curves were prepared and Beer's Law was used to determine the amounts in each of the unknown soil samples. The results of these studies will be discussed as well as an analysis of the protocols.

## **Got Nutrients? (Poster and Physical Display 31)**

*Sara Zachritz, Grace Weisenmiller, Margaret Edmiston  
Dr. Matthew Crawford*

This experiment analyzed the quantities of different nutrients within soil samples. This process was completed using atomic absorption spectrometry, a nitrate ion selective electrode, and a combustion oven. The atomic absorption spectrophotometer was used to measure the concentrations of nutrients in both a set of standards and a soil sample. The standards were used to generate a calibration curve, which was used to determine the concentration of different nutrients present in the soil sample. The nutrients tested for were potassium, zinc, copper, magnesium, calcium, and manganese. The samples from the gardens and the compost contained the greatest amount of moisture. A sample from an area with no grass growth was found to have the most acidic pH. A compost sample was found to have the greatest amount of organic material. The majority of the rest of the results are precise, but additional studies need to be completed to evaluate accuracy.

## **Renewable Fuels Derived from Furfurol (Poster 32)**

*Erin Benton, Matthew Ellison  
Dr. Benjamin Norris*

Angle strain is a powerful way to store potential energy in molecular structures. The synthesis of potential fuels containing strained polycyclic rings are being synthesized from furfural, which is a biorenewable compound derived from fructose. If the synthesis is successful, the angle strain will be estimated using calorimetry.

## **Soil Analysis: An In-Depth Analysis of Different Soil Samples in the Frostburg Area (Poster and Physical Display 33)**

*Celia Lichtman, Abena Abu, Hussaine Hassan  
Dr. Matthew Crawford*

The purpose of this study was to analyze the quality of various soil samples from the Frostburg Maryland area. In this study, an atomic absorbance spectrophotometer was utilized in determining the various metals in the samples. The samples were also tested for their nitrate levels, total organic components and their pHs. The overall conditions of the soil samples were quite poor, with low levels of nutrients, though sample 3's nutrient levels were higher than the others. For Ca and Mg, the concentrations in sample 3 were 12.98 ppm and 3.35ppm respectively. The concentration of Cu was unmeasurable. For Mn, Zn, and K, the concentrations were 6.49 ppm, 4.93 ppm, and 1.26 ppm respectively. Sample 3 also had a pH of 6.3 which is in the optimum pH range for soils. The total organics of sample 3 was 1.3 g, which was the highest value out of the other samples. The nitrate test showed that samples 1, 2, and 6 had high concentrations of nitrates (63.68ppm, 1816 ppm, and 269.26 ppm respectively) while sample 5 was unmeasurable.

## **Solid Phase Peptide Synthesis (Poster 34)**

*Erin Kennedy, Amy Weakland  
Dr. Matthew Crawford*

Peptides are created naturally by the body using the biological building blocks of amino acids. This research will create a synthetic peptide of a unique design using solid-phase Boc-protected amino acids. The synthesis of the peptide will include 10 amino acids, a decamer. Synthesis and cleavage of the decamer are currently being optimized. The decamer was analyzed using high performance liquid chromatography (HPLC). The results of these initial trials will be discussed, as well as improvements to the synthesis and cleavage protocols.

## **When Life Gives You Geraniol, Make Limonene: Synthesis of Limonene Using a Biosynthetically Inspired Route (Poster 35)**

*Thomas Richardson, Lauren Rosch  
Dr. Benjamin Norris*

Limonene is a terpene molecule and an essential oil responsible for the scent in lemon grass and lemons. A synthesis of limonene from 6-methylhept-5-en-2-one is being investigated. Ethyl geranate has been successfully synthesized from 6-methylhept-5-en-2-one using a Horner-Wadsworth-Emmons reaction. Ethyl geranate will be reduced to geraniol using lithium aluminum hydride. The cyclization of geraniol using a high concentration of sulfuric acid is also being investigated. Gas chromatography-mass spectroscopy is used to determine the identity of intermediates and end products throughout this synthesis.

## **DEPARTMENT OF COMMUNICATION STUDIES**

### **Analysis of Michael Crichton's "Environmentalism as Religion" (Poster 36)**

*Justice Sifford*  
*Dr. Brent Kice*

This project will be a response to Michael Crichton's speech "Environmentalism as Religion." It will use the arguments made in Crichton's work to support the stance taken in the project. This project will also examine the argumentation strategies used by Crichton in the speech, and state whether these strategies were effectively used.

### **Edward Snowden: What to Do? (Poster 37)**

*Nicholas Mills*  
*Dr. Brent Kice*

Analyzes Snowden's actions regarding the classified information he released to the public and assesses the legality and morality of these actions. Concludes that these actions were morally acceptable on utilitarian grounds, but illegal and therefore suggests that the U.S. government should not drop charges, but cease pursuit.

### **Expectations Violations Theory: Extensive Research Paper (Poster 38)**

*Jasmine N. Adams*  
*Dr. Brent Kice*

Inside this thorough research paper and study I tested whether the usage of humor is positively correlated with the intimate distances between two anchors. The major theory which I used within my study was the Expectations Violations Theory. The artifact I analyzed in this study is a morning news show called Good Morning America; I focused on Robin Roberts and George Stephanopoulos. People have various interpretations of the use of light humor in this artifact and what is considered funny. The limitations in this study contradicted my hypothesis a little bit.

## **The Real Housewives of New Jersey: Is Blood Thicker Than Water? (Poster 39)**

*Jamie Freedman*

*Dr. Brent Kice*

I coded certain actions and words from five housewives on *The Real Housewives of New Jersey* to determine whether or not sibling relationships were prominently more supported than friend relationships, using the communication theory of symbolic interactionism.

## **DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGIES**

### **Interactive Real-time Media Streaming with Reliable Communication (Oral Presentation)**

*Kevin M. Free*

*Dr. Xunyu Pan*

In this work, we propose a novel real-time media streaming model implemented at the Internet application layer. In this multimedia networking model, the developed media streaming application runs on top of the User Datagram Protocol (UDP). Consequently, the proposed streaming protocol can provide efficient high-speed data transmission for streaming HD video and audio. Unlike traditional real-time streaming protocols such as Real-time Transport Protocol/RTP Control Protocol (RTP/RTCP) this streaming protocol supports reliable media data transmission based on a UDP packet loss recovery mechanism. In addition, the new application model is designed to support high level interactivity where end-users can control the media streaming session and perform social interactions via an integrated Instant Messenger (IM). We demonstrate the application model with an effective streaming media system called  $\rho\epsilon\upsilon\mu\alpha$  which is based on the widely available Microsoft .NET Framework and Windows Presentation Framework.

### **Musical Examination and Generation of Audio Data (Poster 40)**

*Timothy J. Cross*

*Dr. Xunyu Pan*

Sound is commonly digitalized and stored within our computers. Mostly this is done so that we may playback the data and listen to it, but could we do more? The research conducted in this study considers how to further utilize the examination and generation of sound by extracting and storing more information from the data. By gathering extra information from a given audio source, it is thought that it could be used to help musicians have an insightful look at the music they create. This data could also be helpful to amateur musicians seeking to improve their musical knowledge and skills. Finally, simple ways of generating audio data in the form of music could further be used by musicians looking to advance their understanding of music. By implementing the mentioned techniques, an application can be created that could be powerful in assisting individuals interested in learning more about music.

## **Pipeline Monitoring Interface (Poster 41)**

*Steven Moon, Daniel Herold, Nicholas Bray, Christopher Gresch, Chad Bean, Rick Limpert  
Dr. Michael Flinn, Dr. Xinliang Xheng, Dr. George Rinard*

The purpose of this project was to create a functional website for Berkeley Springs Instruments, LLC, and in the process learn about Web development and determine which tools and processes would be the most effective. The site would be used by BSI's customers to view information generated by their pipeline monitoring products. A focus on data visualization and site usability was requested. During this project, many languages and tools were studied and utilized. A template was made from HTML and CSS, which was meant to display data from a database via PHP scripts and MySQL queries. The team experimented with CSS frameworks, like Bootstrap, and content management systems, like Drupal. The current objective is to design a simple and specialized content management system with custom databases.

## **Yet Another Webcam Application (Poster 42)**

*Travis O'Donnell  
Dr. Xunyu Pan*

There is no doubt we live in a technology driven world today. We are capable of being a long distance away from another party, but yet able to communicate with them as if they were with you. Companies such as Google and Skype do a great job at video conferencing, but run off of an older Client/Server network model. The proposed software, "Yet Another Webcam Application," is to create a minimal, cross platform, service for on the go point-to-point webcam application. Unlike Google and Skype's Client/Server model where your webcam and audio stream goes through their server before being sent to another user, the point-to-point model directly connects two nodes over the network. The goal is to create a simplistic and possibly quicker way for people to be able to video chat with each other across the Internet. The software is to be able to run cross platform as long as Java Runtime Environment version  $\geq 1.6$  and OpenCV version  $\geq 2.4.0$  is installed on the clients computer.

## **DEPARTMENT OF ENGLISH**

### **Leaders in Our Fields (Poster 43)**

*Ruth Fabre, Jacob Vacura, Tevin McDonald  
Dr. Amy Branam Armiento*

This poster highlights research presented at the Maryland Collegiate Honors Council conference held at McDaniel College this March. These students' well-reasoned and researched papers provide overviews of recent hot topics in each presenter's area. For instance, one presenter who plans to become an OB/GYN uncovers the personal, professional, and ethical consequences confronting OB/GYNs who are mandated to perform abortions. Another presenter argues against conflating computer scientists with hackers while a third presenter looks at the negative consequences of "fudging" on resumes. Through engaging with the issues in their fields early on, students will have a firm grasp on the types of changes that they would like to introduce to their fields and engage in big-picture visions for their careers and professions.

### **Project Censored (Poster and Physical Display 44)**

*Markisha Barber, Shannon Brown, Korei Martin, Tavarsha Timmons, Chris Ullery  
Mr. Andrew Duncan*

Students in the Socially Networked Journalism class (ENGL 355) present their contributions to Project Censored, a non-profit media-watchdog group based at Sonoma State University in California. A student-driven effort nationwide, Project Censored highlights unjustly underreported news stories, or "News that didn't make the news."

**DEPARTMENT OF GEOGRAPHY**

**A GIS Analysis of Outdoor Campus Lighting, Frostburg State University (Poster 45)**

*Alan Tanwi*

*Dr. Francis Precht*

This study examined the location of all outdoor street lights and emergency call boxes on the campus of Frostburg State University in order to assess potential night-time security issues.

**Engineered to Natural: Chronicling the Changes of the Sand Spring Run Stream, 1976-2013 (Poster 46)**

*Alice Millard*

*Dr. Philip P. Allen*

The Sand Spring Run stream (SSR) is a 1522 ha drainage basin, in Allegheny county in the west central watershed of the Chesapeake Bay. The SSR flows across the campus of Frostburg State University (FSU) and the channel was relocated in 1976 c. 200m to the SW for the construction of a football field. Following the relocation it was again modified in 1995 by FSU via channel straightening. The engineering changed the SSR from a natural sinuous channel Rosgen class C to one that closely resembles a Rosgen class Aa+ channel, but with a low slope range (<2%) and with a relatively apparent uniformed channel depth (no numeric data available). Following the last phase of channel straightening the SSR has begun to revert back to a “natural” sinuous state by progressive erosion of its narrow floodplain regulating its transport capacity and efficiency. In addition non-uniformed bed erosion has occurred along the engineered section leading to differential removal and deposition of a wide range of sediment sizes, prompting phases of channel readjustment to seasonal inputs (winter melt) and high magnitude but low frequency precipitation events. In 2013 a channel morphology-monitoring program was instigated, to allow comparison of contemporary channel characteristics with historic records obtained from aerial photographs, with the goal of modeling and predicting future channel modification.

## **Mimicking Nature: Developing Laboratory Procedure to Model Terrace Formation (Poster 47)**

*Shelby Hohman, Meridith Johnson, Bradley Musser, Connor Woodring, Cory Wright  
Dr. Philip P. Allen*

River terraces are relatively flat bench like features commonly associated with fluvial landscapes. Formation of terraces is caused by lateral erosion and down cutting of the channel bed. Although formation in the natural environment appears to be an unassuming task, generating a physical model in the laboratory to replicate their formation is far from simple. We examined the contributing environmental factors, such as water velocity, channel slope angle and sediment composition and size in order to design a laboratory procedure to allow controlled formation of fluvial terraces. Experiments with variable factors such as water velocity and flow duration succeeded in developing a protocol that results in a model for repeatable terrace formation. Our experiment identified an optimum range of water velocity of between 40-80 ml/s with 0° slope angle, which accurately modeled lower reach or floodplain locations for terrace formation. The model also utilized storm precipitation to produce phases of enhanced geomorphic activity that lead to channel readjustment and terrace formation. However, our experiment only generated asymmetrical paired terraces which may be due to physical constraints such as the relative small stream table used (L167xW60xD11cm) and a near uniform sediment particle size (1mm coarse sand). To reduce the impact of scale limitations for further modeling development we suggest the construction of a larger stream table (L500xW250xD50cm) and the use of varied color heterogeneous sediment ranging from 0.5mm – 10mm.

## **Surface Stream Hydrology in the Clarksburg Special Protection Area (Poster 48)**

*Elizabeth Llewellyn*

*Dr. Phillip P. Allen, Dr. Richard Russo, Dr. Craig Caupp*

The purpose of this project is to investigate the surface stream hydrology in the Clarksburg Special Protection Area (CSPA). In addition, we will determine if there are any impacts or changes to the stream characteristics occurring as result of increasing urban development.

## **Take Me to the River: Identification of a Recently Exposed Palaeochannel at Westbound Junction 29 (Finzel) I-68 Maryland. (Poster 49)**

*Jeremy Brown, Austin Hennessey, Cody Esmond, Shannon Fife, Dakota Hamilton, Herbert Hardin, Bradley Herget, Mark Monis, Kimberly Nielsen, John Reidell, Nathan Rosenberger, James Seabolt, Jennifer Shaffer, James Sherrard, Shawn Stabile, Jessica Warren*  
*Dr. Phillip P. Allen*

In April 2014, during a GEOG 207 experiential field assignment, it was noted that a fresh geologic section was exposed following winter storm activity. The exposed section contained morphological evidence for a lithified infilled palaeochannel. Standard geologic field investigation techniques and measurements were applied resulting in a stratigraphic profile recording interbedded shales and mudstone, and brown cross-bedded sandstone; with examples of fragmentary plant fossils. Additional laboratory analysis utilized Visible Geology software and generated a 3D digital model of the stratigraphic section with the over and underlying strata averaging a dip of 21° with a strike of 090 (east). The strata have been tentatively correlated to the Hampshire Group of Upper Devonian – Lower Mississippian rocks (circa 360-340 Ma). The lithified palaeochannel measured 1.6m by 0.55m with a scoured curved lower contact. We conclude that the feature conforms spatially and temporally with previously identified palaeochannels identified at junction 29 on the eastbound section of I-68. Further digital modeling of the palaeochannel features would be possible with the adoption of RockWorks16, a versatile subsurface modeling software platform.

**What Flows Within: Determining Contributing Factors to the Seasonal Variations of Conductivity of the Sand Springs Run Stream (SSR). (Poster 50)**

*Amy Broadwater*  
*Dr. Philip P. Allen*

De-icing material (ordinarily sodium chloride, NaCl, but commonly referred to as salt) is applied to roads and walkway surfaces to improve safety of pedestrians and vehicular traffic. Due to the ease that NaCl goes into solution and becomes relatively mobile it may pose an environmental hazard to surface and ground water quality. Between April 2012 and August 2013 four HOBO stream conductivity sensors were deployed to monitor the influence of NaCl entering the SSR stream. Our monitoring recorded variation in the electrical conductivity of the SSR stream water, ranging between 846-142 micro Siemens ( $\mu\text{S}$ ). The average baseline was determined to 318 $\mu\text{S}$  with higher values being associated with short duration storm precipitation activity. The residence time for elevated  $\mu\text{S}$  levels was measured in hours, suggesting a “flashy” regime of the SSR. We conclude that the influx of NaCl into the SSR is not a significant environmental issue in terms of quantity and residence time within the SSR on the FSU campus. However the accumulation and environmental impact of our NaCl downstream of the FSU campus remains to be determined.

## **DEPARTMENT OF HISTORY**

### **“10,000 See Corpse”: The Politics of Race and Lynching in Western Maryland, 1900-1914 (Oral Presentation)**

*Katie Dignan, Daniel Weir  
Dr. Greg Wood*

This presentation examines the history of lynching violence and white racial anxieties in western Maryland. During the early years of the twentieth century, a series of incidents in Allegany County illustrated how the supposedly Southern culture of lynching violence impacted local communities in the region.

### **The FSU Arboretum: Nature, Science, and History (Poster and Physical Display 51, Oral Presentation)**

*Kaitlyn Bates, Nicklas Harvey, Cindy League, Carson Mackie, Matthew Perry, Corder Phillips, Tyler Ruffo, Tammi Stevens, Caroline Tonacci, Aaron Walker, Nicholas Watson, Ashlynn Whitecotton, James Zoller  
Dr. Eleanor H. McConnell*

Our Group Research Project for HIST 433 Public History was to develop a proposal for how to interpret the history of the FSU Arboretum. This site is currently used as a lab by the natural sciences, but the site is also rich in human history. Through research into historical events and archival records, design and safety issues, publicity strategies, web page design, and logistical and maintenance plans, we created a plan to highlight the historical features of the site. If implemented, this plan will draw more visitors to the Arboretum, increase use, and promote a more vital local community at the university. This project served two functions: it provided hands-on experience for students interested in public history work, while also creating a viable plan to improve an under-utilized university resource. At the Symposium, we will present our proposal with PowerPoint and other visual aids, and provide written copies of our recommendations.

**Thinking with Their Glands: Generational Differences over Sex in *All in the Family* (Oral Presentation)**

*Katie Dignan*

*Dr. Greg Wood*

This presentation examines the politics of the sexual revolution in the 1970s through the lens of the popular television situation comedy *All in the Family*. Numerous episodes of the show reflected changing attitudes about sexuality, marriage, and family life in US society, and the show's writers and actors themselves worked to shape the conversation about love and marriage in America.

**DEPARTMENT OF MASS COMMUNICATIONS**

**Sexual Content of *True Blood* (Poster and Physical Display 52)**

*Aubree Telck*

*Dr. Melissa Boehm*

The HBO series, *True Blood*, is a television program that has pushed the limits of sexual content. The purpose of my research was to find out if viewers watched *True Blood* due to its sexual content or if other aspects of the program appealed to viewers. I used interviews, focus groups, content analyses, and surveys to guide me in my study. Though this was an exploratory study and no generalizations can be made, I found that the sexual content, as a whole, did not bother the respondents. This could mean that many of the respondents were used to watching television programs with sexual content.

## **DEPARTMENT OF MATHEMATICS**

### **Curly Curvy Crafting: A Study of Approximate Models of Negative Curvature (Poster and Physical Display 53)**

*Erin Kennedy*

*Dr. Marc Michael*

Surfaces of constant curvature play an important role in geometry. Most interesting perhaps is the case of constant negative curvature, which provides a model for hyperbolic geometry and has applications in a number of areas in science. The purpose of this project is to encourage a visual and intuitive understanding of negatively curved surfaces through the presentation of physical, hand-held models. Paper and fiber craft techniques developed from several sources are utilized. Mathematical notions such as Gaussian Curvature are highlighted as well as results from Euclidean and non-Euclidean geometry.

### **The Tangency Problem of Apollonius (Poster 54)**

*Michael Shannon*

*Dr. Mark Hughes*

An ancient problem of Apollonius asks for the construction of a circle tangent to three given circles. This problem was mentioned in a 4<sup>th</sup> century commentary, though the solution was lost over time. Renaissance mathematicians had an interest in reconstructing lost works from ancient Greece and François Viète of France was among those to solve this problem. In 1600, the details of his solution were published in a book entitled “Apollonius Gallus” – the French Apollonius. His solution was in the Greek style which preferred constructions which could be done by straightedge and compass alone. As with Apollonius, some or all of the three given circles could be replaced with points or lines and a total of ten cases were demonstrated. The final case of three circles (CCC) relies on the CCP case which itself depends on the CPP construction. The freeware “GeoGebra” provides an outstanding tool for illustrating and providing insight into the details of Viète’s proof.

## **DEPARTMENT OF NURSING**

### **Africa: A Community Health Assessment (Poster and Physical Display 55)**

*Jessica May*

*Ms. Mary Beth McCloud*

For the Population-Focused Nursing Practice course through Frostburg's RN-BSN program the students are to devise a Community Health Assessment of a community of their choice. This assessment is to cover demographic, epidemiologic, social, and environmental factors as it relates to the particular community they have chosen. It is also to apply nursing diagnoses and interventions according to the specific health needs assessed by the nurse within the community. As a student of this course I was given a special opportunity to have the community I assessed to be the community of Kpele Tsiko, Togo, West Africa. I was given the opportunity to go on a mission's trip in July 2013 and January of 2014, a total of 5 weeks, to serve at the Hôpital Baptiste Biblique in Togo, West Africa. It was amazing to be able to see a hospital in a third world country and apply it to my own experience as an RN here in the U.S. This is a 40 bed hospital that is run by American family practice physicians, OB-GYNs, general surgeons, and pediatricians that have dedicated their lives full time to serve at this hospital. There are also several American nurses that have chosen to serve there full time as well. While I was there I was able to spend a lot of time within the hospital, but also out in the community. Every day was a day packed with new things to see. The doctors and nurses were so welcoming to let me help with pretty much anything I was willing to do. I was able to follow the pediatricians and help with the kids. There they see many children with malaria so there are many blood transfusions given. I was also able to assist with the OB-GYN during a C-section for twins. There were also many days spend with the general adult population assisting with many different illnesses. Throughout my time at the hospital in Africa, I noticed a common theme: most of the illnesses that the Togolese people suffered with were PREVENTABLE. For example, malaria can be prevented with the simple use of mosquito nets and environmental mosquito treatment. Now I understand that it would not be 100% effective, however it would significantly reduce the malarial death rate, especially in children. Other diseases that would could be prevented with simple teaching includes, HIV, hypertension, and amoebas ingested from unclean water or uncooked meat. Teaching people how to take care of themselves, in this case physically and spiritually, is one of the most valuable things a nurse can do.

## **DEPARTMENT OF PHILOSOPHY**

### **Cottingham and Putnam: A Meaningful Life through Social Capital (Oral Presentation)**

*Regan Riley*

*Dr. H. Skott Brill, Dr. Jean-Marie Makang*

One of the big questions in contemporary philosophy is how does an individual go about leading a meaningful life? In his work *On the Meaning of Life*, John Cottingham gives a convincing means through which an individual could potentially maximize the meaningfulness in their lives by engaging in activities which meet certain criteria. These criteria include both moral and functional considerations in conjunction with a theistic view of the world. In his work *Bowling Alone: The Collapse and Revival of American Community*, Robert Putnam analyzes the ways in which the decline of social capital has undermined the civic engagement which is so fundamental to American democracy. He also describes how cultivating this social capital improves the lives of those throughout society. Through a secular reinterpretation of Cottingham's *On the Meaning of Life* examined in conjunction with Putnam's *Bowling Alone*, it is revealed that the cultivation of social capital not only benefits society, but also benefits the individual by allowing them to live a more meaningful life.

### **How Mythology Has Shaped the World: From Primitive Rituals to Modern Philosophy (Oral Presentation)**

*Kerry O'Malley*

*Dr. Jean-Marie Makang*

Everybody loves hearing the story of a good myth, but why? My presentation will illustrate how mythology is intertwined with the development of human civilization, as well as significant philosophical musings throughout the ages. From the first recorded ritual burials of the Neanderthals to present day, myths and folklore have remained a fundamental device for humanity's understanding of themselves and the universe.

## **Plato's Theory of the Forms as a Misinterpretation of Language Games (Oral Presentation)**

*Timothy Nooney*

*Dr. Jean-Marie Makang*

Our discussion focuses on examining Plato's theory of the Forms through Ludwig Wittgenstein's linguistic philosophy. In this process we will touch upon the theory of the Forms as dialectic between Heraclitian and Parmenidian ontology. We will discuss how a misunderstanding in the origin of meaning, or definition predicates Plato's theories. During the discussion I will use Wittgenstein, Friedrich Nietzsche, and Terrance Klein's perspectives to argue my position. In addition to Plato's writings, we will discuss Bertrand Russell's work, which will serve as the basis of our analysis. Using Wittgenstein, I will argue that Plato's methodology is the basis for his misinterpretation of meaning, or definition, whereby Plato unduly favors the Parmenidian ontology and abstract Forms over the sensible or phenomenal world. Plato's conception of reality and knowledge operates through examination, definition, and theorization of binaries with regards to the synthesis.

## **DEPARTMENT OF PHYSICS AND ENGINEERING**

### **Capacitor System to Replace Car Battery (Poster and Physical Display 56)**

*James Ratino*

*Dr. Wudyalew Wondmegegn*

In this project, the fabrication of a super capacitor system proved to be capable of long-term replacement for a car battery. The system's goal was not only to be a potential replacement for a battery but also be an environmentally conscious alternative. Super capacitors serve as an extremely lightweight, lead free, and chemical free alternative to batteries. The constructed system consisted of eighteen super capacitors in a circuit, enabling the system to carry a maximum charge of 16.2v and 660amps. The system was sealed in a polycarbonate container. Two bolts and four nuts were used in lieu of battery terminals, allowing proper contact with vehicle starting cables. A voltmeter was used to measure the systems charge in between each engine start. This was critical in refining the design and fabrication of the system. It also revealed some challenging aspects in using capacitors, as they discharge much faster than batteries. To remedy the issue, the final system will integrate a solar panel to trickle charge the capacitors and keep the system ready to go at all times. To date, the project has proven successful and yielded the potential for long-term replacement.

### **CCPV (Poster and Physical Display 57)**

*Alexander Bishop, Daniel Meiselman, Michael Durr, Liku Waka*

*Dr. Orguz Soysal, Dr. Mohammed Eltayeb*

Increasing efficiency concentrated cogenerated photovoltaic solar power: retrofitting trough type solar panel with thermal cogeneration.

## **Converging Nozzle System for a VAWT (Poster 58)**

*Jeffrey Cavey, Tom Smith, Tim Kelly, Anthony Adedokun  
Dr. Mohammed Eltayeb*

Our undergraduate engineering group scaled down a vertical access wind turbine and incorporated a nozzle system that follows a principle of fluid dynamics. By doing so gives us the opportunity to design a wind turbine that can perform at low wind speed while still obtaining the peak efficiency of other modern turbines. This was tested by creating 4 known blade designs in a 3D printer and subjecting them to a various speeds in a wind tunnel including and excluding the nozzle system and comparing results. Our poster showcases the data, designs and results from our extensive testing of our blades and how they were affected from the introduced nozzle design.

## **Development of a Low-Profile, Self-Actuating Fence Line Trimmer for Agricultural Equipment (Poster and Physical Display 59)**

*Jeremy Lowe, Amanda Meneghini, Jacqueline Sauer, Andrew Sisler, Andrew Summerfield, Brian Umbel  
Mr. Craig Wilson*

A common problem associated with grass control is maintaining the area that grows around fence lines, especially along lengthy fence rows on farms. Conventional methods of control, such as the use of a weed trimmer, herbicides, or livestock are time consuming, inefficient, and labor-intensive. In light of these problems, a new approach has been taken by a team of Mechanical Engineering students from Frostburg State University and the University of Maryland, College Park. The Low-Profile, Self-Actuating Fence Line Trimmer is a PTO-driven agricultural implement that attaches to a tractor's three-point rear hitch and extends beyond the tractor's wheel base on the right-hand side. Utilizing a mechanical system that directs the cutter head around each fence post, it is designed to efficiently cut the grass underneath the fence-line without the need to alter the tractor's straight-line path.

## **Gas Ordering in the Barred Galaxy NGC 3627 as a Test of Galactic Structure Theories (Poster 60)**

*Paul Rooke*

*Dr. Jason Speights*

The relative locations for the peak intensity of tracers for different gas components (neutral: H<sub>I</sub>, molecular: CO, and ionized: H $\alpha$ ) are found along the bar and spiral pattern of NGC 3627. The most commonly applied theories of galactic structure assume that patterns trigger star formation. A specific ordering of the different gas components across the pattern follows from this assumption. The preliminary results shown in this poster are currently being analyzed to test for pattern triggered star formation. As a bonus, discontinuities are discovered at the transition from the bar to the spiral pattern, which is consistent with different rotation rates for the two types of patterns.

## **Gold and Ore Shaker Table (Poster and Physical Display 61)**

*Ian Cuddahee, James Retino, Tommy Anderson*

*Dr. Mohammed Eltayeb*

Redesign a previous failed shaker table to separate gold ore and other metals.

## **Number Density of Cosmic Ray Muons at Frostburg State University (Poster 62)**

*Dustin Ullery, Tyler Ram, Thomas Moorehead, Robert Lemaire, Garrett Kessell, Matthew Riley, Paul Rooke, Brian Huynh, Alexandra Wentling, Wyatt Haggerty, Tom Smith, Joe Gleason, Joe Wilson, Morgan Allman*

*Dr. Jason Speights*

The Physics and Engineering Club built a cloud chamber for detection of cosmic rays. This helped teach the members of the club about design, construction, and implementation of a scientific instrument. The chamber is an airtight glass tank containing felt cloth which has been saturated in 2-propanol (alcohol). This tank sits on a layer of dry ice which super-cools the resulting alcohol vapor. The cosmic rays are visible as they pass through the cloud leaving visible trails of ionized alcohol vapor. Using an understanding of the Ideal Gas Law and mean free path, we use our data to calculate the density per second of cosmic rays at Frostburg State University.

### **SERF Energy Analysis (Poster 63)**

*Chris Fuller, Kyle McKinney, Chad Bean, Moreon Back, Jessey Ervin, Travis Neff, Ryan Kare, Raymond Hzenadaga  
Dr. Mohammed Eltayeb*

Design a smart wireless sensor network control system.

### **Streaming Velocities in the Grand Design Spiral Galaxy NGC 3031 (Poster 64)**

*Mike Firth  
Dr. Jason Speights*

The spiral arm streaming velocities are measured for the neutral hydrogen gas in the grand design galaxy NGC 3031. This is important for understanding the secular evolution processes in NGC 3031, and testing theories of spiral structure. This poster shows preliminary results from models fit to the streaming velocities. The results will be used to refine future modeling strategies.

### **The Locations of Supermassive Black Holes with Respect to the Kinematic Centers of Their Host Galaxies (Poster 65)**

*Jeff Cavey  
Dr. Jason Speights*

The location of the super massive black hole is compared to the location of the kinematic center for 10 galaxies. This is important for understanding galaxy formation and their subsequent evolution according to theories of hierarchical galaxy formation. The location of the super massive black hole is identified from the central radio continuum source. The kinematic center is found by modeling observations of the hydrogen gas. This poster showcases the data and results for NGC 3031.

## **DEPARTMENT OF PSYCHOLOGY**

### **An Examination of Cooperation in Cotton-Top Tamarins (*Saguinus oedipus*) (Poster 66)**

*Rebecca Bowers, Michael Johnson, Timothy Wright  
Dr. Erica Kennedy*

Animals often need to cooperate in order to obtain resources. A study on chimpanzees by Cronin *et al.* examined whether or not resource attainment is collaborative and shared among chimpanzees or if social hierarchy and dominance affects obtaining the resource. Results showed that in the presence of another, the chimpanzee obtained fewer rewards than if alone. If one chimpanzee ranked higher, the other would abstain from solving the task, and if the chimpanzees had close social relationships they tended to spend more time together in the problem solving space but infrequently worked together or shared. Our experiment is intended to replicate this study in order compare the differences between the chimpanzees and the cotton-top tamarins. Although results in the study showed that chimpanzees did not really cooperate, it may be more likely among tamarins due to their small size and possible difficulty in manipulating objects. Twelve tamarins, each cage pair at a time, were observed to see if they could obtain a reward by pulling up the strings attached to a tray dropped down in a clear plastic container. The attempts of the tamarins to solve the problem were recorded when the tamarin was on top of the tower and manipulating the strings or tray or attempting to reach in to grab the reward. We plan to analyze the extent to which tamarins work together in order to solve this problem. Observations are still in progress and we hope to gain a better understanding of the extent to which cooperation occurs in tamarins.

## **Judgment of Psychological Knowledge (Poster 67)**

*Angela Bartlett, Nathan Maust, Cristina Weiner, Krista Hart, Stephanie Kuehne  
Dr. Alan Bensley*

We investigated the accuracy of students' metacognitive judgments of their knowledge of psychology in relation to performance on a new test of psychological knowledge and misconceptions. Neither the mean of certainty ratings of the correctness of item responses nor students' estimates of their test scores were correlated with scores on the test, but global ratings of their psychological knowledge were. Generally, students overestimated their test performance, but students in the highest quartile were better calibrated.

## **The Perception of Fairness in Cotton-Top Tamarins (*Saguinus oedipus*) (Poster 68)**

*Tyler Meiners, Jennifer Tyrell  
Dr. Erica Kennedy*

A sense of inequity and fairness is thought of as a human trait, but many animals have demonstrated this ability. Studies have been done with great apes, monkeys, crows, ravens, and dogs. The goal of our study was to see if cotton-top tamarins had this skill. In this experiment, the cotton-top tamarins had to touch their nose to a drumstick, as they had been trained to do in the past. In each pair of tamarins, one tamarin received the greater reward, a raisin, and one received the lesser reward, a Cheerio. In two of the four cages the male received the greater and in the other two the female was given the greater treat. This was done to see the role that dominance played in the results. Preliminary testing showed that the tamarins prefer raisins over Cheerios, and under normal circumstances the tamarins will accept a Cheerio as a reward. Data collected included the number of trials each tamarin participated in, the time it took for one of the tamarins to complete the task, and whether the reward was accepted or rejected after completion of the task. We are analyzing this data in order to determine whether tamarins display a sense of inequity when completing this task.

## **Relational Match to Sample in Tamarin Monkeys (*Saguinuso oedipus*) (Poster 69)**

*Florent Grain*

*Dr. Erica Kennedy*

This study examined the relational matching-to-sample (RMTS) ability in a New World primates species, the cotton-top tamarin monkey. It was once believed that only humans and language-trained chimpanzees were able to master analogical concepts. This study investigated this capacity in cotton-top tamarin monkeys through a relational matching-to-sample procedure, which requires subjects to use analogical reasoning in order to succeed. In order to test the RMTS capacity in this species, we used a task similar to the one used in capuchin monkeys in a study by Kennedy & Fragaszy (2008), but using different stimuli and relations. The task involved hiding a reward under 1 of 3 similar plastic cups, 2 maintaining a similar relation with each other but a different relation with the third one. The subjects were allowed to look for a hidden reward under the cup in their set of cups which were comprised of similar plastic cups maintaining a different relation. Twelve monkeys interacted, but only 8 participated enough to have their data collected. Data is being analyzed in to order to determine if another New World monkey species can solve an analogical problem.

## **Students' Knowledge and Awareness of Psychological Knowledge and Misconceptions (Poster 70)**

*Maci Quintanilla, Paige Wagner, Jordan Staggs, Crystal Rainey*

*Dr. Alan Bensley*

This study examined students' knowledge and awareness of their own psychological knowledge in relation to their performance on a new test of psychological knowledge and misconceptions. Their test scores were significantly correlated with the mean certainty ratings of the correctness of their item responses as were their global estimates of their psychological knowledge. Although students often overestimated their test performance, they did show some limited awareness of their own level of psychological knowledge.

## **Texting Behaviors and Expectations in College and High School Students (Poster 71)**

*Kristen DeWitt, Victoria Suess, Stephanie Kuehne  
Dr. Michael Murtagh*

There is relatively little information in the scientific literature regarding texting behaviors. This exploratory study focused on texting behavior in both high school and college students, as well as examining for sex differences. A total of 340 students (170 high school, 170 college) in the Mid-Atlantic region voluntarily completed a questionnaire concerning texting behaviors and attitudes. Participants engage in a great deal of texting each day (college students averaging sending 190 text messages a day and high school students averaging 185 text messages a day), unfortunately often in an unhealthy manner. Over 60% of those old enough to drive reported texting while driving (23.1% of those, reported doing so more than once a day). Nearly 60% sleep with their phone to avoid a significant other becoming angry if they do not respond to a text and 58.2% reported they had been texted by a person to the point where they found it upsetting. It is recommended that students be taught from a young age appropriate versus inappropriate texting behaviors.

**DEPARTMENT OF SOCIAL WORK**

**Class Participation and Its Outcome (Poster 72)**

*Sandrine Akindo*

*Dr. Terry Russell*

This is an empirical study to explore what influences academic achievement. A class survey was used to measure how much students were learning compared to previous classes, and why some were learning better than others. To compare results of academic achievement, a pretest was administered at the beginning of the semester and a posttest at the end; the data for only students who took the pretest and posttest was measured. This was then compared to previous semesters. To determine why some students did better than others, variables were collected in a survey and were included as control variables and rival explanations; these variables included sleep, class participation, marital status, and watching TV during quizzes. The results showed that students who got enough sleep at night, attended class, and participated did significantly better than students who did not.

## **DEPARTMENT OF VISUAL ARTS**

### **Dynamic Effects in Scientific Illustration (Poster and Physical Display 73, Oral Presentation)**

*Parris Ashley*

*Ms. Judith Dieruf*

This presentation will show the tools, preparation, and visual research used to create natural science illustrations. Specifically, an illustration using extreme perspective to show the surface of a moon, its host planet, stars, nebulae, galaxies, and deep space. Several works will be displayed. Topics covered will include: "Light Effects for Nebulae and Galaxies," "False and Curvilinear Perspective," "Using Fractal Patterns in Illustration," "Combining Oil and Acrylic Paint," "Hubble DST 'Photos': What Are We Seeing?" and "Special Effects."

### **Scenic Art: A World of Giant Paintings (Oral Presentation)**

*Bridget Willingham*

*Ms. Judith Dieruf*

In my artwork, I explore the techniques and utensils used in crafting drops, murals or other large-scale paintings. The drops I am showing you are normally used in theater sceneries. I work in theater so that I can develop my skills in large-scale paintings. Over the years, I have worked with different theaters. Through those theaters I have learned different methods on how to create illusions on stage. Illusions make the audience feel as if they are in the same reality as the actors. As a scenic artist, it is my goal to make these illusions by using drops and techniques such as wood graining, and marble work. The difference between a standard painting and my paintings are that my paintings are made to be seen from a distance. This involves a complete different technique. When I paint I attach my brushes to bamboo sticks, so that I can paint from a distance. I must be aware of the contrast of colors so that they can be seen from a distance. Scenic art to me is more than just painting large sceneries, it is creating new realities. From learning scenic art I have expanded my skills farther than I could imagine. Seeing my drops come to life onstage creates a feeling that can only be captured in the theater.

## **CLAS Undergraduate Research Working Group**

Karen Keller, Biology (Chair)  
Phillip Allen, Geography  
Matthew Crawford, Chemistry  
Judith Dieruf, Visual Arts  
Justin Dunmyer, Mathematics  
Robert Hein, Visual Arts  
Mark Hughes, Mathematics  
Erica Kennedy, Psychology  
Brent Kice, Communication Studies  
Willson Kwok, Biology  
Jean-Marie Makang, Philosophy  
Eleanor McConnell, History  
Jill Morris, English  
Benjamin Norris, Chemistry  
Xunyu Pan, Computer Science and Information Technologies  
Terry Russell, Social Work  
Rebekah Taylor, Biology

### **Joseph Hoffman, Dean of the College of Liberal Arts and Sciences (Opening Remarks)**

Linda Steele, Program Specialist, CLAS  
Cindy Troutman, Executive Administrative Assistant, CLAS  
Lynn Ketterman, Research Assistant, University Advancement  
Brienne Huot, Annual Giving Specialist, University Advancement

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