

2014

# Celebrate

A CELEBRATION OF  
STUDENT RESEARCH AND  
CREATIVE ACTIVITY

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## Department of Biology

### **EFFECTS OF ENVIRONMENTAL CONDITIONS ON ROOSTING BEHAVIOR OF CHIMNEY SWIFTS**

**Christian Alegria, David Dougan, Greg Dougan, John Dougan, Carli Kahny, Cynthia Zubia  
(Dr. George Farnsworth)  
Department of Biology**

The population of chimney swifts, *Chaetura pelagica*, has declined in the past several decades. This decline may be due, in part, to the loss of large industrial chimneys lined with rough-textured bricks typical of urban buildings built during the early 20th Century. Chimney swifts use communal roosting in large numbers during their Fall migration. To better understand the use of these declining roost sites, we observed the roosting behavior of chimney swifts every evening from 29 August to 3 October of 2013 at the Xavier University Schmidt Fieldhouse. We video-recorded chimney swifts entering the roosting site at 5-minute intervals starting approximately ten minutes before sunset and ending when the last bird entered the chimney. Various environmental conditions were recorded simultaneously to determine their effects on roosting behavior. Some environmental conditions such as temperature, day length, light intensity, and noise level were compared to timing of roosting behavior. The strongest correlation ( $R^2=0.3388$ ) was found between light intensity at sunset and the peak number of birds entering relative to sunset. The data showed that when light intensity was lower, birds roosted earlier relative to sunset. A better understanding of how chimney swifts use large industrial chimneys for communal roosting during migration may help inform conservation efforts.

### **EVALUATION OF PHEROMONE RELEASE DEVICES AND TRAP DESIGN TO DEVELOP A BROAD-RANGE SURVEY TOOL FOR EXOTIC LONGHORNED WOODBORING BEETLES IN ALASKA**

**Michael Apicella (Dr. Ann Ray)**

**Department of Biology**

Woodboring beetles are serious pests in both managed and natural forests. Longhorned woodboring beetles (Coleoptera: Cerambycidae) are of particular concern due to their potential for introduction via international commerce into areas outside their native ranges. Current methods for detecting woodborers are unreliable in temperate rainforests, such as those located in Southeast Alaska, necessitating studies to improve technology for detection and monitoring. We report the results of a 10-week field survey to assess the effect of lure design on trap capture of longhorned woodboring beetles. We used compounds known to be used as pheromones by multiple cerambycid species: (E)-6,10-dimethyl-5,9-undecadien-2-ol (fuscumol), (E/Z)-6,10-dimethyl-5,9-undecadien-2-yl acetate (fuscumol acetate), racemic 3-hydroxyl-hexan-2-one, 2-(undecyloxy)-ethanol (monochamol), and racemic 2,3-hexanediol. Traps baited with volatile pheromones captured 114 individuals of nine species, representing eight genera of four subfamilies. There was a significant treatment effect due to lure design. In addition, we were surprised to capture 1176 individuals of *Nicrophorus defodiens*, 85% of which were captured in traps baited with fuscumol acetate. This result suggests that fuscumol acetate may be a sex pheromone for *N. defodiens*.



## LYSOSTAPHIN ERADICATES MATURE *S. EPIDERMIDIS* BIOFILM IN VITRO

Nithin Banda, Andrew Elluru, Megan Montalvo (Jennifer Robbins)

Department of Biology

Infections with Staphylococcal biofilm continue to pose a serious threat to patients with medical implants. In this study, the effects of lysostaphin by itself and in conjugation with the licosamide antibiotic lincomycin were investigated. Mature *Staphylococcus epidermidis* biofilms were grown in vitro and treated with lysostaphin of concentrations ranging from 0.2 ug/mL to 200 ug/mL. In a follow-up experiment, mature *S. epidermidis* biofilms were treated with either 20 ug/mL lysostaphin, 20 ug/mL lincomycin, or both 20 ug/mL lysostaphin and 20 ug/mL lincomycin. Lysostaphin eradicated *S. epidermidis* biofilm in a dose-dependent manner at concentrations of the enzyme ranging from 2 ug/mL to 200 ug/mL (two-tailed T-test;  $P < 0.001$ ). Lincomycin treatment at 20 ug/mL had no effect on the density of *S. epidermidis* biofilm, although higher concentrations of the antibiotic were not investigated (two-tailed T-test;  $P = 0.89$ ). Our results provide further support for the clinical viability of lysostaphin in the treatment of Staphylococcal biofilm infections.



## SOCIOECONOMIC FACTORS AFFECTING LUNG CANCER INCIDENCE IN AMERICA

Stephanie Bates, Sarah Bremer, Molly Magri (Dr. Jennifer Robbins)

Department of Biology

This research project was performed in order to better understand the role socioeconomic status has on lung cancer incidence in America. We hypothesized that there would be certain socioeconomic factors that would influence the behavior and environments of individuals, thereby either increasing or decreasing their frequency of smoking or their exposure to pollution. After gathering the average lung cancer incidence data for each state, including Washington D.C. and excluding Mississippi and Tennessee (due to lack of records), as well as data for 42 different independent variables, we used statistical analyses to determine the correlation and significance of these factors and their effect on lung cancer incidence. Ten of these 42 factors were found to be significant correlations. We concluded that factors in the groups of poverty, age, educational attainment, and certain occupations were correlated with lung cancer incidence and further research is needed to determine if they are truly causations of this deadly disease.



## THE ROLE OF L-TYPE CALCIUM CHANNELS IN BRADYKININ-INDUCED VASOMOTION OF BOVINE CORONARY ARTERIES

**Brittney N.Z. Bonsall, Katie M. Flick, Tom A. Gerbus, Matthew J. Gibson, Corina Marziano, Elizabeth G. Potter, Patrick S. Riedy, Chelsea Schmoll (Dr. Lisa Close-Jacob)**  
Department of Biology



The purpose of this experiment was to study the mechanism underlying bradykinin-induced vasomotion in bovine left anterior descending coronary arteries. The hypothesis was that L-type calcium channel activity is responsible for this vasomotion, with a prediction that nifedipine, an L-type calcium channel inhibitor, would terminate the bradykinin-induced oscillations. Left anterior descending bovine coronary arteries were dissected carefully to preserve the endothelial layer. Two transverse rings were cut from each artery and hung on force transducers in separate chambers. Each chamber contained Krebs's solution maintained at 37 °C and bubbled with 95% oxygen and 5% carbon dioxide which maintained solution pH at 7.4. Each artery was treated with U46619 ( $5 \times 10^{-8}$  M) to induce a contraction followed by treatment with bradykinin ( $5 \times 10^{-7}$  M), an agent that is known to cause endothelium-dependent relaxation and has been shown to induce vasomotion. Once vasomotion was observed, nifedipine (10  $\mu$ M; dissolved in DMSO) was added to the artery that was undergoing vasomotion while DMSO, a vehicle control, was added to its paired arterial ring. Developed tension with U46619 treatment was 42.86 g/mm<sup>2</sup>. Bradykinin caused an average percent relaxation of -54.71% (percent calculated as magnitude of relaxation/developed tension). Nifedipine terminated vasomotion in all eight arteries in which oscillatory behavior was observed, while DMSO had negligible effects on tension and vasomotion. Therefore, these data suggest that L-type calcium channels are responsible for bradykinin-induced vasomotion in bovine left anterior descending coronary arteries.



## EFFECT OF FOOD ON AGGRESSIVE BEHAVIOR IN *OREOCHROMIS AUREUS*

**Jonathan Burgei, Dana Gaines, Landan Knecht, Caroline Lee, Alexandra Lobas, and Trisha Reddy (Dr. Charles Grossman and Richard Hamilton)**  
Department of Biology



The common blue tilapia (*Oreochromis aureus*) is a food fish native to Africa but is now effectively grown in aquaculture worldwide. Being of the cichlid family the male becomes highly aggressive and territorial upon reaching adulthood. Previous studies have looked into the causes of aggressive behavior, including the influence of light, as well as the aggression affects on fish mortality. Therefore, the aim of this study was to firstly characterize types of aggressive behavior and secondly to determine what factors might trigger these behaviors. Working with three adult male specimens housed in a 55 -gallon tank, separated by dividers, we identified three clearly distinct types of aggressive behaviors (liplocking, fin biting and chasing). Using the nonparametric, Wilcoxon Matched-Pairs Signed statistical analysis we discovered that aggressive behavior, overall, was significantly higher before feeding ( $p= 0.01$ ) compared to after feeding.

## THE EFFECTS OF SHORT-TERM EXPOSURE OF NAPROXEN ON XENOPUS LAEVIS TADPOLES

Lakeisha Crouch, Jake Litmer, Aaron Patterson (Dr. Jennifer Robbins)

Department of Biology

Pharmaceutical contaminants have globally entered river systems through human excretion and direct disposal, and many wastewater treatment plants are unable to filter pharmaceutical waste from the wastewater received. Inevitably, these toxins build up in various aquatic environments, affecting both the organisms and the structure of their ecosystem. Those with neurobiological activity, such as non-steroidal anti-inflammatory drugs (NSAIDs), are especially problematic. In this experiment, the NSAID naproxen (found in Aleve), was examined for effects on the development of the South African Clawed Frog, *Xenopus laevis*. Naproxen was chosen because it acts by binding the enzyme cyclooxygenase (cox) and inhibits the conversion of arachidonic acid to prostaglandins in Anurans. Previous studies have documented the effects of other cox inhibitors such as ibuprofen and acetaminophen on Anuran development. Tadpole survivorship, growth and activity were all monitored at concentrations around that which have been detected by numerous water quality assays. Survivorship was decreased in high concentrations. Differences in activity and growth were not significant. The acute exposure of naproxen on *X. laevis* survivorship provides the basis for testing the effects of chronic exposure on other aquatic organisms.



## AMUR HONEYSUCKLE (*LONICERA MAACKII*) AND ITS EFFECTS ON SOIL RESPIRATION IN A SOUTHWESTERN OHIO WOODLAND

Edith Delgado, Brian McNeill, Molly Sterling (Dr. Brent Blair)

Department of Biology

Invasive species are a serious threat to numerous natural ecosystems because of their ability to invade and cause major alterations to ecosystem function, structure and composition. Previous studies have suggested that invasive shrubs can affect soil characteristics in the area that they invade, and these changes have implications for the survival of indigenous species in the area. *Lonicera maackii* is a woody shrub that has invaded Southwestern Ohio forests, dominating the understory layer and out-competing several native species. The purpose of the present study was to investigate potential effects that the presence of the invasive *L. maackii*, also called bush honeysuckle, may have on soil respiration in Cincinnati forests, a process that is dependent on plant roots and soil organisms along with many other factors. In the spring of 2014, the research team collected and compared soil respiration rates of plots with honeysuckle to the rates of plots without honeysuckle, and collected measurements of the soil temperature and soil moisture to compare as well. The team also compared this data to data that was collected in July 2013 and November 2013. The research is ongoing.







## THE TRANSFORMATION AND CONJUGATION OF AMPICILLIN RESISTANT ESCHERICHIA COLI

William Gannon, Nicholas Stapleton (Dr. Jennifer Robbins)

Department of Biology

There is growing concern regarding the development of antibiotic resistance in clinical and agricultural settings due to the prevalence of antibiotics that exist there. However, antibiotic resistant traits are used extensively in research labs and even in undergraduate classrooms. We aimed to determine whether undergraduate laboratory transformation experiments could contribute to the spread of antibiotic resistance. Studies have been done on antibiotic resistance in large scale hospital and waste-treatment environments; we applied similar methods to an undergraduate laboratory. We first examined whether ampicillin-resistant *E. coli* were left in the laboratory after the General Biology freshmen performed a transformation lab. In addition, we tested how efficiently ampicillin-resistant bacteria could transfer its resistance to other bacterial genera. The undergraduate lab was swabbed in five highly trafficked areas; swabs of the undersides of work tables, sides of chairs, and doorknob produced no resistant cultures, while swabs of the sink and table tops contained some resistant bacteria. These *E. coli* were plated with various strains of bacteria, including several other Enterobacteriaceae as well as gram positive genera with clinical relevance. We then used selective and differential media to determine if ampicillin-resistance was transferred. The results were assessed by the colony counting plate method. Our findings could have immediate implications for the safety and cleaning procedures used by undergraduate labs and could provide incentive to test this hypothesis more thoroughly in clinical environments in the future. In addition, the results indicate the possible contamination of sewage water and the release of resistant bacteria into the environment. Further experimentation could better determine the clinical and environmental consequences of the spread of antibiotic resistance in an aquatic environment.

## MUSCULOSKELETAL ANATOMY OF THE LOWER HIND LIMB IN MAMMALS: ADAPTATIONS FOR DIGITIGRADE LOCOMOTION IN FELIS CATUS

Brittani Gimenez (Dr. Anyonge)

Department of Biology

This study compares musculoskeletal adaptations for various modes of locomotion in the lower hind limb of several tetrapods, including the domestic cat, *Felis catus*, the gray wolf, *Canis lupus familiaris*, the opossum, *Didelphis virginiana*, the armadillo, *Cingulata*, and the human, *Homo sapiens*. Mechanical advantage of plantarflexor muscles and two types of distal elongation – foot elongation and limb elongation – were estimated for each species. A detailed dissection was also performed on all calf muscles and tendons in the lower hind limb of the cat in order to comprehend the anatomy and function of the lower hind limb. It was hypothesized that species with calf muscle complexes attached closer to the ankle joint, coupled with digitigrade foot posture, will have a lower mechanical advantage, but exhibit higher speeds than plantigrade animals during locomotion. Results indicate that mechanical advantage of plantarflexor muscles in cats (mean=0.196) is significantly smaller ( $p < 0.05$ ) than that in armadillos (mean=0.5) and humans (mean=0.304), whereas foot elongation (mean=0.937) is significantly higher ( $p < 0.05$ ) than that in the opossum (mean=0.535) and human (mean=0.454). There was no significant difference observed in limb elongation among these five species. From these results, it can be concluded that primary cursorial adaptations in the cat are digitigrade locomotion (foot elongation) and low mechanical advantage in the plantarflexor muscle-joint complex. Due to those adaptations, it can be said that cats favor high stride frequency and enhanced speed of movement.

## THE ROLE OF ALTERNATIVE SPLICING OF EXON 23A OF THE NF1 GENE AND CARDIAC DEVELOPMENT

Kyle Grim (Dr. Paulding)

Department of Biology

This study was done to investigate the effects of alternative splicing of the *NF1* gene on cardiac development. Neurofibromatosis type 1 (NF1) is a common genetic disorder that affects 1 in every 2,500 to 3,000 individuals. Individuals with mutations in the gene can develop cardiac defects, including hypertension, vasculopathy, and congenital heart defects. The protein translated from the gene, neurofibromin, is a Ras regulating protein. Exon 23a adds an additional 21 amino acids to the transcript, making neurofibromin less effective in deactivating Ras. It was hypothesized that proper splicing of exon 23a is essential to cardiac development, and improper splicing will lead to cardiac defects. To test this, two mutant lines of mice embryonic stem cells were compared to wild type: one with the exon always included, designated as  $*/*$ , and one with the exon always deleted, designated as  $\Delta/\Delta$ . The cells were differentiated into cardiomyocytes and plated. Their beating frequency was recorded by observation under a microscope, Ras activity was monitored using a Western Blot for phospho-MAP kinase, and sarcomere structure was observed via immunofluorescence. Results indicated that the  $*/*$  mutation had a significantly smaller beating frequency (mean=55 bpm,  $p<0.01$ ) than both the wild type (mean=67.4 bpm) and  $\Delta/\Delta$  (mean=65.3 bpm). The  $*/*$  group also had the most phospho-MAP kinase, followed by wild type, then  $\Delta/\Delta$ . It can be concluded that splicing of exon 23a affects cardiac development via the Ras pathway, and therefore is responsible for some of the heart defects observed in individuals with the mutant gene.

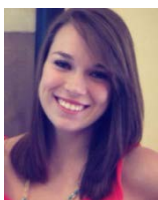


## CRANIAL MORPHOLOGY AND FEEDING BEHAVIOR IN THE MADAGASCAN FOSSA, CRYPTOPROCTA FEROX

Kayla Johnson (Dr. Anyonge)

Department of Biology

The fossa is widely known as the largest land mammal in Madagascar belonging to the family Eupleridae. Despite its cat-like appearance, some of its traits and behaviors indicate its close relation to the mongoose and civet families Herpestidae and Viverridae, respectively. This study investigated the relationship between cranial morphology and dietary and hunting adaptations in the fossa. Several cranial features that have been shown to be good indicators of feeding behavior were analyzed in the Fossa and its closest relatives as well as in inland African carnivoran species in the families Felidae, Canidae, and Hyenidae. The Fossa displayed a relatively larger zygomatic arch width than the meerkat in the family Herpestidae but did not differ from the Felids and Hyenids. Continental Felid and Hyenid species had relatively larger moment arms of the masseter and temporalis muscles than the Fossa suggesting that the latter have greater bite force than the Fossa.



## ESTIMATION OF ENDOCRANIAL VOLUME THROUGH THE USE OF EXTERNAL SKULL MEASURES IN CATS

Caitlyn McAlpin (Dr. William Anyonge)

Department of Biology

Previous studies show a strong correlation exists between adult body size, brain weight, or volume in mammals although differences are observed among taxonomic groups (Finarelli, 2006). Other studies suggest that the degree of encephalization increases as the complexity of a certain social environment increases; one study explained that the relative gestation length increases the brain size in addition to the social brain hypothesis (Swanson et al., 2012). The purpose of this study was to determine the relationship between brain size and external skull dimensions in domestic cats, *Felis catus*, and in turn use measures that highly correlate with brain volume to predict brain size in living and extinct cats. The brain size of living cats was determined from fresh brains extracted from preserved specimens used in the vertebrate anatomy course at Xavier University. Digital images of skulls of living cats were obtained from the Smithsonian Institution, Washington DC. Cranial and mandibular measurements were made using ImageJ and statistically analyzed using SYSTAT®. Neurocranium length had the highest correlation with brain volume ( $r=0.702$ ).



## **CANID BRAIN VOLUME AND BEHAVIOR**

**Patrick McCory (Dr. William Anyonge)**

**Department of Biology**

The Family Canidae demonstrates a wide variety of social hierarchies and hunting techniques between various species. Canids also exhibit a wide range of body sizes from the fennec fox to the extinct dire wolf. They have evolved and adapted to different ecological niches and become some of the most successful hunters in the animal kingdom. In order to examine the correlation between behavioral complexity and brain size, various external skull measurements that reflect brain size were analyzed in four canid species, including the extinct Pleistocene dire wolf, *Canis dirus*. It was hypothesized that canid species with larger brain volumes and skulls, such as *Canis lupus* (gray wolf), will exhibit a higher capacity for more cooperative hunting strategies and organized pack behavior.



## **TRAVEL OF M-TYROSINE ACROSS MICORRHIZAL NETWORKS IN VARYING NITROGEN SYSTEMS**

**Sarah Neuman, Zachary Steinkoenig (Dr. Kathryn Morris)**

**Department of Biology**

Mycorrhizal fungi have a very important symbiotic relationship with plant roots. The fungi must be connected to the roots in order to survive, and in return the fungi enhance many of the functions the roots already have, such as absorption of water. Over time the fungi grow into an extensive interwoven network that connects the neighboring plants, this is referred to as the common mycorrhizal network. Throughout the world, nitrogen is more available to plants due to increased use of fertilizers and pollution. Our experiment looked at the effect nitrogen levels had on the travel of chemicals across the CMN. We developed a CMN between two maize nurse plants in separate halves of a two-compartment pot, and set up two different nitrogen systems, a high system and a medium system. m-Tyrosine was added to one side of each pot. We sampled the soil from each side of the pot and performed an extraction in order to run the samples through a HPLC to test for traces of m-tyrosine. The m-tyrosine degraded before the sample was taken but several compounds were found in the samples. One compound, with a peak absorbance around 220 nm, had significantly different concentrations across pot halves; the half with m-tyrosine added contained more of the compound. Biomass for the nurse plants was not affected by either treatment.



## **WEST NILE VIRUS DETECTION BY RT-PCR IN IMMATURE MOSQUITOES IN SOUTHWEST OHIO**

**Krista Swegheimer (Dr. Robbins, Dr. McIntosh, Dr. Farnsworth, Dr. Engle)**

**Department of Biology**

West Nile Virus (WNV) is a mosquito-borne flavivirus that has caused disease outbreaks among avian and mammalian hosts, including humans, in the United States every summer since it was introduced in 1999. Although only 20% of infected people develop symptoms, WNV can cause neuroinvasive disease and even be fatal. As there is no treatment or cure, the only weapon presently available against WNV is to prevent its spread through mosquito vector control. In order to efficiently and cost-effectively reduce mosquito populations, control efforts have targeted bodies of standing water where larvae and pupae develop. Relatively few studies have tested larvae for WNV prevalence by reverse transcriptase polymerase chain reaction (RT-PCR). Because the virus is vertically transmitted from female adults to their offspring, testing larvae is an alternative way to test for WNV among mosquitoes, which has predictive value for disease incidence in humans. We counted and collected mosquito larvae biweekly from May-October 2013 at four collection sites in the greater Cincinnati, Ohio area; estimated the composition of the mosquito pools; and tested them for WNV by reverse transcriptase polymerase chain reaction (RT-PCR) and gel electrophoresis. We detected WNV among mosquito larvae beginning in early June, which supports previous studies that show that WNV is vertically transmitted among mosquitoes. Because our first positive result occurred month before the first human case in Ohio, monitoring WNV prevalence among developing mosquitoes could be an early indication of WNV presence. Early knowledge that WNV is present in a region would allow public health departments to apply control measures in order to prevent the spread of WNV to avian and mammalian hosts.



## Department of Chemistry

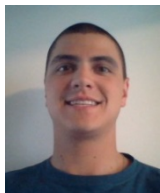


### **CATALYTIC OXIDATION OF PRIMARY ALCOHOLS BY TRANSITION-METAL-TRIPHOX COMPLEXES**

**Ted Bedell, Vincent Shallal (Dr. Craig Davis)**

**Department of Chemistry**

Baldwin and co-workers at the University of Cincinnati have previously synthesized nickel (II) complexes with ligands that contain three oxime functional groups, one being H3TRISOX (tris(2-hydroxyiminopropyl)amine). Our group increased the overall steric bulk of H3TRISOX by replacing the three methyl groups with phenyl groups to form the ligand H3TRIPHOX. This ligand is synthesized by converting 2-chloroacetophenone to its oxime, then reacting three equivalents with ammonia. Next, mixing  $MCl_2$  ( $M = Ni, Cu$ ) with H3TRIPHOX in acetonitrile yields the complex M-H3TRIPHOX-Cl<sub>2</sub>. Oxidation studies are carried out by dissolving M-H3TRIPHOX-Cl<sub>2</sub> in a primary alcohol (methanol, butanol, or benzyl alcohol), which acts as both substrate and solvent, then adding three equivalents of tetra butylammonium hydroxide. (This deprotonates the three oxime O-H groups. One of the deprotonated O atoms then forms a coordinate-covalent bond to the M center on another metal complex; in turn, an O atom on the second complex acts as a bridging to the first M center. The resulting dimer is the active catalytic species.) The volatile components are distilled from the catalyst. Gas Chromatography is used to detect the presence of the corresponding aldehyde; by employing internal standards, we are able to quantify the number of catalytic turnovers.



### **DEVELOPEMENT OF ANALYTICAL METHOD FOR BUTYLRGANOTIN COMPOUNDS**

**Cole Cwynar (Dr. Barbara Hopkins)**

**Department of Chemistry**

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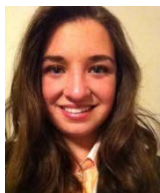


### **DETERMINATION OF CADMIUM CONCENTRATION BY ANODIC STRIPPING VOLTAMMETRY**

**Joseph Dahl (Dr. Adam Bange)**

**Department of Chemistry**

Cadmium is highly toxic and over exposure to this element usually targets the body's cardiovascular, renal, gastrointestinal, neurological, reproductive, and respiratory systems. It is also known to cause cancer. Metal smelting plants have shown to produce higher than normal levels of heavy metals in the air including cadmium. When heavy metals are inhaled it bypasses normal biliary excretion methods and directly enters the brain, which increase concentration levels in the body and increases the chance of health risks. Because of these health risks, level of heavy metals in the body need to be regulated by analyzing bodily matrices. A major problem in the healthcare field today is that the determination of these heavy metals in the body is not as accessible as professionals would like them to be. Rapid point-of-care micro sensors to help analyze levels of heavy metals at certain thresholds in whole blood must be developed. This project seeks to examine the efficiency of bismuth films on the detection of cadmium using anodic stripping voltammetry. The use of anodic stripping voltammetry acts as a very sensitive electro analytical technique where a reducing potential is initially applied to a working electrode, which immobilizes the reduced analyte species, in this case cadmium, onto its surface. The next step requires applying an oxidizing potential sweep to the electrode to re-oxidize the cadmium at its characteristic oxidation potential, which strips it off the electrode.



### **DEVELOPMENT OF AN ANALYTICAL METHOD FOR THE DETERMINATION OF TRIPHENYL TIN CHLORIDE BY HIGH PERFORMANCE LIQUID CHROMATOGRAPHY**

**Angela Hanna (Dr. Barbara Hopkins)**

**Department of Chemistry**

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## **SYNTHESIS OF COMPOUNDS FOR THE INTERNATIONAL CLINICAL COMPOUND LIBRARY (ICCL) PROJECT**

**Nicholas Krabacher, Jacob Stephens (Dr. Richard Mullins)**

**Department of Chemistry**

There is great need for compounds to be made readily available for testing as potential disease treatments. For this reason, the International Clinical Compound Library (ICCL) Project was founded by the Center for World Health and Medicine (CWHM) at Saint Louis University. The ICCL was developed in the hopes of creating a library of clinically relevant compounds, which were perhaps discontinued and/or shelved before, or during clinical trials. The purpose of this library would be to enable researchers to screen these compounds as new treatments. This repurposing of abandoned drugs might result in medicines which can be used for rare or orphaned diseases, while reducing the time and cost associated with developing a medicine from lead discovery to drug approval. The ICCL has enlisted the collaboration of several Jesuit universities in the United States, including Xavier University. Using known, but slightly modified procedures, our goal is to synthesize six compounds whose original purpose were as potential treatments for a wide variety of ailments including inflammation, Schizophrenia and anxiety, amongst others. Once synthesized, the compounds will be sent to the CWHM for analysis and then added to the growing library of clinical compounds to be made available to researchers. Our progress toward the synthesis of these six compounds will be presented.



## **DETERMINATION OF CADMIUM CONCENTRATION BY ANODIC STRIPPING VOLTAMMETRY**

**Kiersten Mossburg (Dr. Adam Bange)**

**Department of Chemistry**

Cadmium, element 48, is a highly toxic metal that targets the body's cardiovascular, renal, gastrointestinal, neurological, reproductive, and respiratory systems upon exposure. Because of these health risks, cadmium in the body needs to be regulated by analyzing bodily matrices. A major problem in the healthcare field today is that the determination of heavy metals in the body is not as accessible as professionals would like them to be. To combat this problem, rapid point-of-care analytical tools for measuring cadmium in whole blood must be developed. Our aspect of research uses square wave stripping voltammetry to determine the concentration of heavy metals, more specifically cadmium, in solutions. Square wave stripping voltammetry is performed to allow the cadmium to be able to deposit onto the bismuth film, which has been pre-concentrated onto the electrode. The use of anodic stripping voltammetry acts as a very sensitive electroanalytical technique, which can help determine the concentration of heavy metals in solutions. Our project seeks to examine the efficiency of bismuth films on the detection of cadmium.

## **CATALYTIC OXIDATION OF PRIMARY ALCOHOLS USING COPPER AND NICKEL COMPLEXES WITH A TRIS-OXIME LIGAND**

**Imeldah Muli (Dr. Craig Davis)**

**Department of Chemistry**

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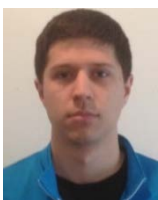


## **DEVELOPMENT OF A METHOD FOR THE QUANTITATIVE ANALYSIS OF COPPER ION USING THE INHIBITION REACTION OF THE ENZYME BROMELAIN**

**Madison Riethman (Dr. Supaporn Kradtap Hartwell)**

**Department of Chemistry**

Copper, while essential for human health at a certain level, can cause serious health effects when ingested in excess. With the increased industrial production using copper, occurrence in the environment is also increasing, therefore leading to a rise in ecological and human exposure. Although there are various methods for copper determination in an environmental or biological sample, many of these processes require expensive instrumentation. The purpose of this study is to develop a quantitative analysis method of copper, utilizing a low cost, naturally available, and environmentally friendly reagent, the enzyme Bromelain extracted from pineapple. It was found that some metal ions, specifically  $\text{Ag}^+$ ,  $\text{Cu}^{2+}$ , and  $\text{Hg}^{2+}$ , inhibit the ability of enzyme Bromelain to digest protein. The extent of the inhibition reaction correlates to concentration of metal ions and it is used here to determine the amount of metal ions. Suitable concentrations and volumes of enzyme and the protein casein were determined. Then, the effects of incubation times between enzyme-copper ion and enzyme-protein were investigated at various temperatures and the optimum experimental conditions were obtained. The future plan is to apply the selected conditions for determination of copper in water and vitamin/mineral supplement samples.



## **DEVELOPING A METHOD FOR THE QUANTITATIVE ANALYSIS OF TOTAL PARABENS BY INFRARED SPECTROSCOPY**

**Zachary Stapleton (Dr. Supaporn Kradtap-Hartwell)**

**Department of Chemistry**

Parabens are widely used as preservatives in many common cosmetic products such as makeup and shampoo, as well as some foods and beverages. Parabens show high antimicrobial effects which are amplified in the presence of other Parabens. The most common Parabens used as preservatives are Methyl-, Ethyl-, Propyl-, and Butyl-parabens. Parabens are esters of p-hydroxybenzoic acid where the length of the side chain of the ester determines the name of the paraben. In 2004 a study was published in the Journal of Applied Toxicology that stated Parabens were found in breast cancer tumors and that Parabens can mimic the effects of estrogen and therefore may be a cause of breast cancer. Traditionally, Parabens are determined both quantitatively and qualitatively by an advanced instrumentation technique High Performance Liquid Chromatography (HPLC). However, the HPLC technique is highly time consuming. The purpose of this project is to investigate the possibility of using the Infrared (IR) spectroscopy as a simple method to determine total Parabens in a sample. The carbonyl peak of the Parabens will be used to both identify and quantify the total amount of Parabens.

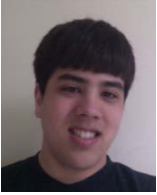


## **ASYMMETRIC CONJUGATE ADDITION REACTIONS FOR SMALL MOLECULE SYNTHESIS: SYNTHESIS OF BOTH ENANTIOMERS OF PILOSININE**

**Mariah Whitaker (Dr. Richard Mullins)**

**Department of Chemistry**

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## **STRIPPING UTILIZING SQUARE WAVE STRIPPING VOLTAMMETRY AND A COPPER ELECTRODE ANALYSIS OF HEAVY METAL CONCENTRATION UTILIZING SQUARE**

**Alex Wong (Dr. Adam Bange)**

**Department of Chemistry**

Square wave stripping voltammetry has been shown to be a viable technique for the analysis of heavy metal concentration in solutions. In most cases, relatively expensive materials such as glassy carbon or platinum are used as the electrode; very little research has been done utilizing a copper electrode. While copper has been displayed to give less consistent results than other electrodes, it may be beneficial in some situations due to its low cost. One situation of particular interest to the Bange group is the creation of a disposable microsensor for point of care analysis of heavy metal concentration in blood. Direct analysis of some heavy metals is possible with a copper electrode, but this is not the case for all heavy metals. Cadmium, for example, forms a strong intermetallic bond with copper upon application of a reducing potential and thus does not strip off in a consistent fashion. Work has been performed using a bismuth surface electroplated onto the copper electrode to determine if more consistent results can be achieved. Bismuth's similarity to mercury, which works well as an electroplated surface, displays its potential for working in this technique.

## **Department of Classics & Modern Languages**



### **VISIONS OF PRIDE: THE CLASSICAL SOURCES OF DANTE'S EKPHRASIS**

**John Appeldorn (Dr. Tom Strunk)**

**Department of Classics**

This project discusses the literary technique *ekphrasis*, the extended depiction or narration of artwork in writing, of Classical Roman literature, and its influence on the works of Late Medieval and Early Renaissance authors, specifically the poetry of Dante Alighieri. Previous scholarship on the influence of Roman *ekphrasis*, specifically James Heffernan's *Museum of Words* and Thomas Putnam's *Virgil's Epic Designs*, for a large part focuses on tracing the style and form of *ekphrasis* in later works both Medieval and Early Modern. This project supports the idea of stylistic influence of Classical *ekphrasis* on Dante's works, but also delves further into the political aspect of the use of art in such works. The periods in which Vergil and Dante wrote were intensely political, often involving many power struggles for control of the state. In ways similar to Classical authors in the political context of Imperial Rome, Dante employs Classical techniques of *ekphrasis* as a means to discuss, evaluate and critique the political situations and turmoil of Late Medieval Florence. This project contrasts and compares the usage of Classical *ekphrasis* in style and form, but also in its socio-political repurposing in Dante's texts. Along with an examination of one instance of *ekphrasis* in Ovid's *Metamorphoses*, the project focuses mainly on the six primary instances of *ekphrasis* in Vergil's *Aeneid*. The project then traces the elements (both stylistic and political) of a Roman *ekphrasis* on Dante's use of art in the *Divine Comedy*; in addition, it compares the developments of style, arrangement, and content of these *ekphrases*. This project attempts to demonstrate how Dante draws on Classical sources of *ekphrasis* not only from a literary technical standpoint, but also as a means of repurposing them for the political contexts of Dante's own time, and as a means to describe a change in the notion of pride.



## **TWICE-MADE MEN: THE JOURNEY TO THE AFTERLIFE AND BACK**

**John-Michael Farkas (Dr. Hall)**

**Department of Classics**

There have been various arguments as to why heroes across a range of Greek and Roman myths must make a journey into the underworld. Some would argue that it is simply the quest for an object or a loved one, or to learn some information that can only be acquired from such a journey, or that a descent to the underworld is simply a necessary task that a hero must undertake. In this paper I will look at the journeys ancient heroes make to the underworld from the point of view of near-death experiences portrayed in modern literature. I will begin by discussing modern stories of near-death experiences cast in literary form, such as the New York Times Best Seller, *Proof of Heaven*. After identifying the key components of this type of experience, I will use these to analyze similar events in classical contexts. The main literary texts containing heroic journeys to the underworld are Homer's *Odyssey* and Vergil's *Aeneid*, and I hope to show that Odysseus and Aeneas, when they descend to the underworld and return to life above, go through something comparable to a near-death experience. In fact, an ancient hero's descent to the underworld fits the three requirements of modern near-death experiences: the need to let go of past events, a look into the future to give hope and motivation, and a comprehensive spiritual transformation that allows an individual to overcome life's obstacles and live in a more fulfilled way. I will also demonstrate that stories about death and rebirth and visions of an afterlife, both ancient and modern, help provide an avenue for widespread discussions on such a topic as near-death experiences.



## **WONDROUS WATER WORKS: MYCENAEAN ENGINEERING AS AN EXTENSION OF EXPRESSIONS OF WEALTH**

**Corey Sadosky (Dr. Shannon Hogue, Dr. Shannon Byrne)**

**Department of Classics**

The Mycenaean Civilization was among the first to experience a vast growth in wealth and power in the ancient world. On account of this growth of personal and palatial wealth, monumental building projects were undertaken as an outward display of wealth and power. On a palatial level, fortification walls served as an outward display of wealth held by the rulers and ruling class; on a personal level, monumental tombs were sponsored by a family and built as an outward sign of the family's wealth. I believe that feats of engineering such as the dam at Tiryns, the artificial port at Pylos, and the drainage system at Gla also contribute to a sense of palatial pride and an outward display of wealth. Having become affluent rulers in the Mediterranean, certain Mycenaeans were able to use their palace sites to take a break from non-stop farming in order to invest time into researching and developing engineering projects. This ability to transition away from work purely for survival demonstrates the availability of money and the affluence of Mycenaean palatial sites. Therefore, the construction and implementation of these feats of engineering must also contribute to the outward palatial display of wealth. In addition, these feats of engineering made obtaining wealth even easier for the Mycenaeans. By constructing the dam at Tiryns, and draining the reservoir at Gla, the palatial sites gained access to far more nutrient-rich soil to increase farming productivity. By constructing an artificial harbor at Pylos, ships were more easily able to dock and trade their goods with the Mycenaean merchants at Pylos. For these reasons I argue that Mycenaean engineering ought to be considered an extension of the demonstration of wealth observed in Cyclopean Walls and monumental personal tombs.

## **EGYPTIAN MUMMIFICATION AND ALEXANDRIAN DISSECTION PRACTICES**

**James Vondenberg (Dr. Shannon Byrne)**

**Department of Classics**

The aim of this thesis is to demonstrate that ancient Egypt's medical system and religious tradition, manifest through mummification, complemented the elements of Alexandrian culture that enabled the practice of dissection and vivisection for a short period of time by the Greek anatomists Herophilus and Erasistratus in Alexandria, Egypt. I will argue that the Egyptian tradition of mummification created a precedence which Ptolemaic rulers in Alexandria could exploit to support the previously, and concurrently, disregarded utility of anatomical study during the time of Hellenistic Alexandria. While Greek traditional thought prevented other scientists and physicians from generally incising human flesh or coming into contact with a corpse, the anatomists of Alexandria systematically performed dissections on human cadavers. On account of the precedence of mummification, in clear contrast to Greek treatment of a corpse, Egypt's ritualistic embalming of the dead seems to have contributed to the culture of Alexandria that allowed for the practice of dissection, and possibly vivisection, by the Greek anatomists Herophilus and Erasistratus.





## **THE GERMAN SHORT STORY: HOW IT ALL BEGAN**

**Katie Hegarty (Dr. Irene Luken)**

**Department of German**

During World War II, Germany went through a lot of turmoil and suffered many losses. The German people were suppressed under the Nazi Regime, and if anyone were to speak out they were severely punished or even killed. Immediately following the war, many German people were living in destruction and despair. It was certain individuals that found a way around the ruling government and the social acceptance, and used their talent and creativity in writing. The new form of literature became known as the German Short Story. It became widely popular in post-war Germany, and two well-known authors that were highly influential during this time period were Heinrich Böll and Hans Bender. This research will take an in-depth look at the German Short Story, its messages to society, and two authors that influenced it.

## **EDUCATION FOR MIGRANTS IN GERMANY**

**Mariam Nasratim (Dr. Irene Luken)**

**Department of German**

This presentation focuses on education for migrant students in Germany. In this paper, I argue that the German educational system needs reform to better serve migrants. I lived in Germany for eighteen years, went to school and finished my education there. As one who underwent the citizenship process in Germany, I can better assess their school system. As a migrant, I had great opportunities in my life, but there are still some issues that need to be addressed to better serve everyone whether they be migrants and natives. I wrote my whole paper in German language, but the presentation will be hundred percent (100%) in English. I covered topics such as: \* My own experience as a student and educator \* Education opportunities \* Language improvement \* Integration and socialization \* Changing of School system for better \* Criticism from different views \* Religious education \* Residence permit (legal or illegal) \* Work permit process \* Racism \* Political foreign policy \* Guest-worker and family \* Berlin institute for population and development studies.

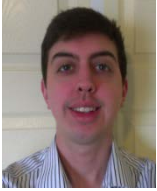


## **SLAVERY AS ENTERTAINMENT: POWER RELATIONSHIPS IN ANCIENT ROMAN COMEDY AND 19TH CENTURY MINSTREL SHOWS**

**Kelly Schmidt (Dr. Shannon Byrne)**

**Department of Honors Bachelor of Arts (HAB)**

This study investigates the common themes in the Roman comedic productions of Plautus and Terence and in 19th century minstrel shows, in order to better understand how and why both types of performance depict slavery as well as why audiences found these depictions entertaining. I argue that both genres of comedy aim to reinforce power relationships of slavery within their respective societies. Yet, at the same time, these comedies provided opportunities for subversion and slave agency within the structures of each genre. I will examine common features of both comedies, including stock characters, costuming and masks, language and wordplay, and physical humor to show how characters in each performance simultaneously reinforce and subvert power structures and the institution of slavery. The inclusion of slaves as entertaining characters in each comedy orients them as objects of interest and fascination that could be viewed from a distance. This distance allows free spectators to create a socially inferior "other" as the object of laughter and ridicule. However, slaves in each performance often adopt these marks of inferiority and employ false obedience to challenge and deceive masters. Whether or not these inversions were lasting, they still suggest the possibility of such subversions in reality.



## **THE VIABILITY OF THE EUROPEAN CENTRAL BANK**

**Alex Pierce (Dr. Irene Luken, Dr. Steven Cobb)**

**Department of Modern Languages  
And Department of Economics**

The European Union has certainly been a great feat of modern culture: the uniting of many different nations' economies on the same continent is no simple task. The purpose of uniting these different countries under a single unified economy was to strengthen the continent's trade and economic standing, allowing for the "free movement of people, goods, services and capital" (EU General Policy). This allowance of free movement relies on the concept that international trade will, in the long run, greatly benefit each participating country. However, with the recent Euro Crisis and the problems that arose as a result, many wonder how effective this system is. When one country experiences a large shock to their economy, ripple effects occur in another country because the EMU is a single market system. Furthermore, it becomes a question of how response mechanisms intended to bring the markets back from recession affect countries differently. This analysis will examine the effectiveness of ECB response mechanisms regarding two major countries, Germany and Spain. These two countries, deemed informally as "best-case" and "worst-case" scenarios, respectively, will be examined from macroeconomic perspectives to determine if ECB monetary policy had the desired effects in recovering from the recession. The GDP growth rate, unemployment rate, GDP-to-debt ratio, bond market interest rates, and bond yields are all data points of interest. Additionally, certain individual economic conditions may exist that can greatly alter the purpose of said response mechanisms. These conditions will be analyzed in a theoretical perspective for further clarity. This analysis will conclude with a theoretical idea of what has been done, and what is needed during times of economic recessions.

## **Department of English**



### **A FLAW OF THE LAW: ADDRESSING INTERSECTIONAL DISCRIMINATION THROUGH EQUAL RESPECT AND OPPORTUNITY WITHIN THE AMERICAN LEGAL SYSTEM**

**Alexander Cipoletti (Dr. Kristen Renzi)**

**Department of English**

While in American society much emphasis has been placed on single-axis discrimination, or where one is discriminated against for a single dimension of her identity, this essay focuses on discrimination based on a combination of dimensions of identity known as intersectional discrimination. The essay examines how the legal system has failed to address matters of intersectional discrimination in the past and asks what changes must be implemented to ensure the legal system works toward preventing this injustice. Ultimately, I argue that a single-axis framework dominates antidiscrimination laws, and these laws prevent courts from recognizing and acknowledging the social salience of intersectional identities and intersectional discrimination. Historically, law makers have addressed discrimination through a practical approach of analyzing concrete discriminatory acts and creating laws to prevent these actions. This approach, however, fails to address issues of intersectional discrimination, so in order to rectify this flaw, I propose a new methodology based on a philosophical and theoretical model of equal respect and opportunity that allows for victims of intersectional discrimination to be extended and achieve full personhood. Through a conversation among law makers, scholars, advocates, and victims that uses a model of equal respect and opportunity, they can create a language of inclusion and expand current antidiscrimination law in order to allow courts to prevent intersectional discrimination.



## ATTEMPTS TO CONTROL NATURE: A STUDY OF THE FEMININE WILD AND RESISTANCE TO COURTLY CONVENTIONS IN THE A MIDSUMMER NIGHT'S DREAM

Katherine Colborn (Dr. Niamh O'Leary)

Department of English

In his book *Anatomy of Criticism*, Northrop Frye termed the phrase “green world” to describe and establish the opposition between the “green world or romance” and the “normal world.” He categorized the green world as the world of “dream” and “desire,” primarily referring to male desire, and ever since there has been increased interest in Shakespeare’s portrayal of gender in light of this distinction. While the 20<sup>th</sup> century welcomed a significant increase in feminist criticism of Shakespeare’s plays, there is still a comparably small amount of scholarship on the relationship between gender and the “green world.” In my essay, I argue that the forest setting in *A Midsummer Night’s Dream* represents masculine fascination with and desire to tame the wild and mysterious feminine. My essay expands upon other scholarly work, focusing primarily on the female characters in *A Midsummer Night’s Dream* and examining their places in the “green world.” The female characters, in their relations with male characters and their position within the Natural world and in the court, emphasize this male-to-female and male-to-nature confrontation. Hippolyta, for example, in her very exotic and Amazonian nature represents a culture that defies and inverts the social structure of the courtly traditions in city of Athens. Theseus’s eagerness to repeatedly conquer Hippolyta—in battle, in their marriage bed—shows a desire to make her conform to the social and cultural practices of Athens. Titania, who is undoubtedly of the natural world, through her disagreement with Oberon creates strife that enhances the wildness of the forest. Oberon’s obsession with controlling her via the magical love potion is designed to produce an obedient and loyal wife, just as Theseus wants Hippolyta to be. However, Oberon’s chief goal is, amusingly, to get custody of a young boy born of an exotic mother—the Indian votaress—a possible allusion to Theseus’ attempt, through the structure of the court, to control the strange and feminine wild Hippolyta represents. The juxtaposition between these two cultures and the green world’s ultimate resistance of courtly convention is evident in the identity of these females: Hippolyta, bringing the natural and exotic into the Athenian court, and Titania, attempting—and failing—to bring forms of structure from the human court into the natural world of the faeries. The common practice of double casting the characters of Hippolyta and Titania becomes an entry point to discuss the fascinating relationship between these women, the court and the “feminine wild,” and is a testament to its persistent and ever-present existence in the green world.



## LOVE MAKES A FAMILY

Campbell Tuel (Dr. John Getz)

Department of English

Throughout my life I have struggled with my identity as an adopted child. In the United States, even though we are considered a "melting pot" or a "tossed salad" of ethnicities, discussing where our families originated is still extremely popular. After many years of feeling left out, I decided to be a part of a broader classification: love. We all love and yearn to be loved in return. I looked closely at Barbara Kingsolver's novel "The Bean Trees" in addition to brief interviews with Dr. Trudelle Thomas of the English department and author of "Spirituality in the Mother Zone," and Dr. Tamika Odum of the sociology department and the associate director of the Multicultural, Gender, and Women's center to discuss the love a mother has towards her children, regardless of biological ties. Combined with the latest data on adoption in the United States, I take a more personalized approach to my family's history, starting with me.



## THE COMMON ROOT: RESILIENCE IN THE FACE OF CULTURE SHOCK

Corey Zielinski (Dr. John Getz)

Department of English

In his 1977 literary work *Roots*, Alex Haley claims that “[i]n all of us there is a hunger, marrow deep, to know our heritage - to know who we are and where we came from” (Haley). This widely acclaimed work has been said to give “roots to the rootless” by encouraging all ethnicities of the American melting pot to explore their own family heritages (Taylor 50). Arguably, this progressive attitude towards understanding one’s heritage has not only led to a better understanding of the American past, but also of our present selves. In contrast to Haley’s claim, my enquiry into my family’s heritage has not satisfied some intense yearning or offered a sense of fulfillment. Instead, it has led me to question whether being in touch with one’s roots is necessary at all. By referencing Amy Tan’s *The Joy Luck Club*, several psychological studies of culture shock, and experiences with my Polish heritage, I will argue that holding on to one’s roots is a method employed by first generation immigrants coping with culture shock. Moreover, in the absence of a cultural dilemma, like culture shock, the need for one to be in touch with their roots subsides. However, as shown by *The Joy Luck Club*, despite the differences between first generation immigrants and the following generations, what can be remembered by keeping these traditions alive is the strength and resilience one needs to succeed.

## Department of History



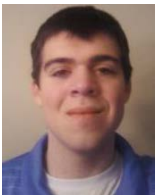
### CORPORATE GIVING: HOW THE PRIVATE SECTOR CAN BE AN AGENT OF CHANGE

Meghan Marth (Dr. Rachel Chrastil)

Department of History

Partnerships between nonprofits and private sector businesses can be mutually beneficial and have the potential to create real and lasting change. Today, nonprofits face many challenges, including complex social issues and restraints from society to keep overhead low. The purpose of my thesis was to research these partnerships and discover best practices. I researched corporate giving partnerships through local case studies with Luxottica and OneSight, The Kroger Company, the Cincinnati Red's Community Fund and the United Way of Greater Cincinnati. I argue the strength of these partnerships and evaluate the organizations on Strategic Planning, Partnerships and Measuring Results.

## Department of Math & Computer Science



### TRANSFORMATION GEOMETRY AND SYMMETRY GROUPS

Michael Reis (Dr. Minnie Catral)

Department of Math & Computer Science

Transformation geometry is a modern approach to Euclidean geometry that beautifully brings together geometry and abstract algebra. This project gives an introduction to transformation geometry and establishes classification theorems of symmetries in the plane. In particular, the ornamental groups (the rosette, frieze, and wallpaper groups) are discussed and applications of the frieze and wallpaper groups are presented. M.C. Escher’s artwork shows a variety of wallpaper patterns. There is a way to classify each pattern’s symmetry as one of 17 wallpaper groups using certain defining characteristics and the symmetries that can be applied to these patterns. Symmetry groups give abstract algebra a visual application that makes it easy to see the elements and composition of elements in a group.

## Department of Philosophy, Politics, & the Public



### **THE IMPACT OF DOPING ON TALENT DEVELOPMENT AND THE NATURE OF SPORT: A LOOK AT WHY DOPING AND SPORT ARE INCOMPATIBLE**

**Nicholas Putz (Dr. Gabriel Gottlieb)**

**Department of Philosophy, Politics and the Public**

Whether or not to permit the use of performance-enhancing substances in sport has long been a very controversial topic. As medicine and technology continue to develop, it will be necessary for sport organizations to take well-grounded positions, either for or against the use of performance-enhancing substances. However, many of the arguments regarding doping in sport fail to look at the issue in depth, and because of that, only scratch the surface of the relationship between doping and sport. Much of the work that has been done on this topic has focused on a single aspect of doping. However, I develop my argument by synthesizing information from a wide range of scholarship, such as sport philosophy, talent development and genetics. Therefore, I will examine the relationship between doping and sport at a much deeper level. I will argue that one of the most important aspects of competitive sport is to challenge and showcase the talents and abilities of human nature. Working from this, I will proceed to argue that doping functions as a way to eliminate this aspect of sport, thus artificially enhancing human ability and distorting the process of natural talent development in sport.



### **THE GREAT IRISH POTATO FAMINE: GENOCIDE OR GOVERNMENT MISMANAGEMENT**

**Austin Van Dusen (Dr. Amy Whipple)**

**Department of Philosophy, Politics and the Public**

This thesis argues and proves that British government policies in regards to relief of the Irish during the Great Potato Famine constitute genocide. The British government used the Potato Famine with genocidal intent to pacify and Anglicize Ireland, deplete perceived surpluses in population and clear the land of the Irish for profitable British capitalists to create a modern economy. Ireland had been trouble for the British for centuries and top government officials saw the potato blight as the most opportune time to finalize the subjugation and Anglicization of Ireland. The two main government ministers who engineered this genocidal plan were Undersecretary to the Treasury Charles Trevelyan and Charles Wood the Chancery of the Exchequer. This thesis analyzes the actions taken by the British government during the Famine, the actions and words of Trevelyan, the scholarship surrounding the Famine which illustrates the obvious intent on the part of Trevelyan and his colleagues to engineer this genocidal campaign. The words and actions alongside educated contextualization of these actions within the historical time paint a clear picture of policies meant to destroy the Irish. The intent was there and everything and everyone that could not survive the Famine and its consequences had no place in Trevelyan's new Anglicized Ireland.



### **EXPERIENTIAL EDUCATION: EXPLORING THE VALUE OF XAVIER UNIVERSITY'S URBAN SEMESTER**

**Laurence Baibak (Dr. Gabriel Gottlieb)**

**Department of Philosophy, Politics and the Public**

Xavier University's Academic Service Learning Semester in Over-the-Rhine, also known as the "Urban Semester," is an experiential education program that has been exposing students to urban environments and guiding them through critical, holistic study of urban issues for over a decade, but it was defunded in 2013. Of the criticisms levied against the program, most may be addressed through administrative and pedagogical changes, while others, such as the supposed lack of student interest, are outright invalid. Drawing from the work of John Dewey, Jean Piaget, David Kolb, and Rebecca Carver, we see that education is the guiding of experience toward learning that produces agency, belonging, and competence as its primary outcomes. The Urban Semester, by placing students in positions of actual responsibility while supporting them with material, informational, and human resources, encourages them to develop an internal locus of control, adapt to new situations, recognize connections, appreciate interdependency, acquire relevant knowledge and abilities, and exercise these capacities in meaningful praxis—the key components of the three primary outcomes of education.



## **POSSIBILITY CITY: TEN YEARS AFTER CITY-COUNTY MERGER IN LOUISVILLE METRO**

**Bailey Drexler (Dr. Gene Beaupre)**

**Department of Philosophy, Politics and the Public**

This paper seeks to understand whether or not the goals outlined as the purpose of the Jefferson County, KY and Louisville, KY consolidation in 2003 have been successfully achieved, as could be reasonably expected in the first decade of Louisville Metro governance. Indicators suggest that while the economic outcomes of consolidation have been underwhelming, the global economic recession may have played a major role in slowing potential economic growth. A central focus of Louisville Metro consolidation was a “shake-up” of the metropolitan city, instantly realized by the surge in city population as a direct result of merger. Immediate results of consolidation included the revitalization of parts of the city’s urban core, renewal of an identifiable city culture and resulting city pride, and the development of a regional and national re-branding of the metropolitan city. Such progress and other economic indicators suggest that Louisville Metro is well positioned to achieve the economic aims of merger in the post-recession economy.



## **TEAM EUROPE: HOW SPORTS CAN BE USED TO INCREASE SUPPORT FOR THE EUROPEAN UNION AND FURTHER THE PROCESS OF EUROPEAN INTEGRATION**

**Andrew Kaplan (Fr. John LaRocca, S.J.)**

**Department of Philosophy, Politics and the Public  
And Department of Political Science**

The question of European identity has long interested scholars. Contrary to expectations, the strengthening of economic ties among European nations has not led to greater political and cultural cohesion and a solidified European identity. One potential solution to the problem of European disunity is to use football (what Americans call soccer) to bring people together and encourage the development of a shared European identity. In this paper, I propose that Brussels combine the national teams of the member states into one team for the Olympics, the FIFA World Cup and other international competitions. The creation of a single European sports team would bring middle and lower class citizens into the fold of “European-ness.”



## **FROM MARGINALIZATION TO FULL PARTICIPATION: AMERICAN CATHOLICISM'S RISE TO CULTURAL ACCEPTANCE IN THE 20TH CENTURY**

**Joe Koenig (Fr. John LaRocca, S.J.)**

**Department of Philosophy, Politics, and the Public  
And Department of Political Science**

This essay explores the changes that the American Catholic demographic has experienced in the 20th century and what events and historical figures have helped change their status from marginalized demographic to a diverse demographic that fully participates in the public political and cultural scene. In the years after World War II, by becoming better educated, wealthier, and more diversely rooted within mainstream American culture, the Catholic demographic shed its "ghetto mentality" and became immersed in American culture, fully participating in its political scene and firmly "seated at the table". Ultimately, gaining exposure and more closely resembling the average American is what helped American Catholics gain acceptance within mainstream culture. The GI Bill of Rights allowed them to leave the ghetto and climb the socioeconomic ladder, John F. Kennedy privatized religion in the public political arena and showed that a Catholic can succeed to the highest public position in America, and the division after Vatican II created a diversity in thought that reflected traditional American values. All of these historical events exposed American culture to Catholicism and slowly eroded the xenophobic and misunderstood feelings that American Catholics received, thus allowing them to become full participants on the American public scene.

## ESTIMATING THE EFFECTS OF ACTIVISM IN THE 2012 US PRESIDENTIAL ELECTION

Trevor McCormick (David Yi, Ph.D.)

Department of Philosophy, Politics, and the Public  
And Department of Economics



The formal spatial electoral model suggests that a political candidate should converge to the electoral mean to maximize his or her vote shares. Empirical evidence of elections in the United States indicates that this model is inadequate; in the United States, candidates often stray from the electoral mean. Current campaign theory proposes the idea that voters' non-policy evaluations of candidate quality, or *valence*, helps explain the divergence from the electoral origin. I argue that this is an insufficient explanation. This paper instead suggests that the incompatibility of candidate equilibrium locations and their estimated positions is the collective result of *activists*— those who contribute resources to candidates or parties. This paper offers an econometric study of the two-dimensional polity map of the 2012 United States presidential election using a stochastic campaign model. I run a simulation using data acquired from the 2012 American National Election Study (ANES) to determine candidates' local Nash equilibria, and to provide a quantitative estimation of the effect of activists on candidate positions within the American polity space.

## FOOD ACCESSIBILITY IN CINCINNATI, OHIO: MEASURING THE AFFECT OF CENSUS TRACT POVERTY RATE ON GROCERS

Pamela Meyerhofer (Dr. Mack Mariani)

Department of Philosophy, Politics, and the Public  
And Department of Economics



Unequal access to healthy food options has recently gained scholars attention. Areas lacking access to healthy food have been called food deserts. Because scholarship is still new, there is not an official definition of food deserts. However, most researchers consider an area with a poverty rate above 20 percent without a grocery store within one kilometer walking distance an urban food desert. Using this definition, this study uses a regression equation to examine the effect of poverty rate on the number of grocers in Cincinnati, Ohio. Census tracts are the unit measure as a proxy for one kilometer walking distance. For this study, it is not possible to measure the actual distance from a neighborhood to the nearest grocery store. Census tracts are small enough to serve as a substitute for exact distance by measuring whether or not a census tract has a grocery store. Access will be measured by the number of full-service grocers, defined as having more than 50 employees, in each census tract. Since we cannot know the exact products in each store, using stores with more than 50 employees serves as a proxy for stores that are large enough to offer a variety of food options, including healthy alternatives. The results show that a high poverty rate significantly reduces the number of grocery stores in high population census tracts, defined as larger than the median tract. Poverty rate has no significant effect in low population tracts, which are smaller than the median tract. Low population areas will not have access to grocery stores because of a general lack of demand regardless of poverty rate. These results indicate that future policies regarding store location, zoning, and other policies regarding food should be concentrated in high population, high poverty areas to address the problem of food deserts in Cincinnati. Other policies would be necessary to address the lack of access in low population areas.

## SEEKING JUST REDEVELOPMENT OF WASHINGTON PARK

Caleb Profitt (Dr. John Fairfield)

Department of Philosophy, Politics, & the Public  
And Department of History



Since its creation in 1862, Washington Park has been one of the most beautiful and controversial public spaces in Cincinnati. When the municipal government purchased land from Presbyterian and Episcopalian cemeteries to form the park, it was located on the northern periphery of Cincinnati. Today, it is situated in the center of the city's urban core and located in the historic neighborhood of Over-the-Rhine. In the past decade, Washington Park and OTR have undergone serious transformations. The revitalization process excited many Cincinnatians, but it also raised questions about the fairness of gentrification in Over-the-Rhine. Led by the non-profit Cincinnati Center City Development Corporation (3CDC), the popular renovations brought many new people to the park. As a private corporation, 3CDC successfully invested millions of dollars into this public space. While the renovations encouraged the revitalization of OTR, I argue that public policymakers must ensure that the benefits of the park are afforded to all citizens equally. All voices of the community must be heard regarding the future of this public asset. Further, some financial revenue from the park should be distributed in ways that benefit the least advantaged members of the community. Washington Park is an exciting space, but it must remain accessible to all residents of Cincinnati.



## "ALWAYS FULL OF STRANGERS:" HERMAN MELVILLE AND THE MARKET REVOLUTION

Josh Sabo (Dr. John Fairfield)

Department of Philosophy, Politics, & the Public

Throughout the heart of the nineteenth century, the American economy underwent remarkable changes that transformed how exchange occurred within its developing market system. Recent studies in the history of capitalism have identified how local trade networks gave way to a national economy where unfounded confidences were the basis of exchange, with familial and communal trust being removed from an economy increasingly dominated by traveling salesmen, fraud, and counterfeiting. From this historical scholarship, this paper develops a critical vocabulary of confidence, exchange, faith, trust, and identity that contributes to a fresh analysis of nineteenth-century American author Herman Melville's work, particularly his novel *The Confidence-Man*. Through this critique, I find that Herman Melville's criticism of the market economy and its effects on interpersonal confidences and political community largely anticipates modern scholarship on what I classify "ownerless capitalism." In analyzing Melville's criticism, we encounter the author often termed America's greatest novelist as suspicious of the country's economic and social changes, with the publication of his final novel accompanying the waning of American idealism on the eve of the Civil War.



## A STUDY OF THE VARIATION IN WEST GERMAN FOREIGN POLICY CONCERNING THE ODER-NEISSE LINE

Joseph K. Sobek (Dr. Irene Luken)

Department of Philosophy, Politics, & the Public  
And Department of German

This study focuses on the foreign policy of the West German government during the Cold War concerning the Oder-Neisse Line, which is the modern border between Germany and Poland. After World War II, one of the most difficult questions the Allies had to address at the Potsdam Conference was the final status of Germany, sometimes referred to as the "German Question." While the Potsdam Conference settled many issues and laid the groundwork for the impending Cold War, it failed to make any permanent decision regarding Germany's eastern border. In fact, the final border at the Oder-Neisse Line was not finalized until 1990, almost 45 years after the Potsdam Conference. What this study intends to do is identify what international and domestic factors influenced the West German foreign policy relating to the Oder-Neisse Line and prevented the border's formal recognition until German reunification on October 3<sup>rd</sup>, 1990. The analysis brings to light the complex interactions between these factors during the chancellorships of Konrad Adenauer, Willy Brandt, and Helmut Kohl and describes how these interactions impacted their foreign policy decisions. While not all West German chancellors will be discussed in this study, the policies of these three chancellors represent the three most important steps towards both reunification of Germany and recognition of the Oder-Neisse Line, which had become intertwined during the Cold War.

## Department of Physics



## SINGLE MOLECULE OBSERVATION OF THE CYCLIZATION OF SHORT DNA DUPLEX.

Teckla Akinyi (Iren Lee PhD, Professor Taekjip Ha)

Department of Physics

In the presented work, a single molecule DNA cyclization assay was used to follow the looping kinetics of single DNA 83 base pair (bp) molecules, utilizing single molecule fluorescence energy transfer (smFRET) technique. Learning the kinetics of short DNA allows us to understand the flexibility of DNA and how it loops around molecules. The assay was first prepared in a sodium ion  $[Na^+]$  free condition and the majority of the DNA was in its unlooped form. A sudden  $[Na^+]$  jump was introduced at different concentrations (50-1750M) and finally yielded DNA in its looping state by annealing the complementary single-strand overhangs of the assay. Looping and unlooping rates were obtained from the kinetic measurements. The result shows a positive and negative linear dependence of the  $[Na^+]$  concentration to the looping and unlooping rate, respectively, until they reach a plateau at 500 mM. The plateau persists until about 1000mM. For concentrations beyond 1000mM, an immoderate increase in looping rate is noticed while the unlooping rate does so gradually. Above 1000mM  $[Na^+]$  there is a preference of looping events that is attributed to the increase of the annealing rate of the overhangs rather than increased flexibility, consistent with earlier studies by Ibrahim Cisse *et al.* (2012). So to conduct studies dealing with flexibility of 83bp DNA we need to focus our salt concentrations within the range 50mM-500mM.





## **OBSERVING THE ENERGETICS OF PROTEIN FOLDING USING PHYSICAL TOOLS**

**Justin Beck (Dr. Justin Link)**

**Department of Physics**

Proteins are the essence of life itself and have a native folded structure. A popular technique to describe protein folding is to measure the energetics between the folded and unfolded protein. Because many proteins are much smaller than the diffraction limit of light, observing them directly is impossible using conventional microscopy. Instead, monitoring protein unfolding can be accomplished by observing the optical properties of specific protein building blocks known as aromatic amino acids. The aromatic amino acids tryptophan, tyrosine, and phenylalanine are known to absorb ultraviolet light, which is very useful in protein studies. Monitoring changes in absorption and fluorescence as a function of temperature allows for insight into the energetics of protein folding and unfolding. Acquiring an understanding of these phenomena can be done using a model enzyme such as the fungal enzyme Ribonuclease T1 (RNase T1) from the organism *Aspergillus oryzae*. The experiment involved using a spectropolarimeter for the steady state absorption and fluorescence of the amino acids in the ultraviolet range of light. Characterization of the optical properties of the aromatic amino acids tryptophan and tyrosine as well as the unfolding of RNase T1 will be presented here..



## **DEVELOPMENT OF AN AUTOMATED PROCESS TO OBSERVE PROTEIN UNFOLDING**

**Ian Bentley (Dr. Justin Link)**

**Department of Physics**

The ability of a protein to function comes about as a direct result of its ability to properly obtain its native, folded structure. In order to determine the structural stability of proteins and to gain knowledge of their folding mechanism, we must develop protocols that allow us to monitor the controlled unfolding of proteins. Here, we investigate the stability of cytochrome c (a well-studied, model protein) under denaturing conditions using fluorescence. Using a chemical denaturant (Guanidine HCl) we can cause a protein to gradually unfold and revert to its unfolded, free-chain state. The changes in the fluorescence spectra can provide insight into the stability of the experimental protein by providing us with thermodynamic parameters such as the Gibbs free energy, melting temperature and enthalpy of the protein. Previous research in this lab has been explored with the circular dichroism spectra of both native cytochrome and various mutant proteins. The objective of the current work was to develop an efficient protocol for monitoring the unfolding of cytochrome c through changes in fluorescence spectra using an automatic titrator and unfolding software. Through much trial and error, the unfolding software has been perfected and the protocol has been shown to be both highly repeatable and capable of producing thermodynamic parameters in agreement with those previously reported in the literature. Further work can now be begun investigating the thermodynamic stability of mutant cytochrome c to determine which regions of the protein have the greatest impact on the process of protein folding.



## **U.B.RAD A URANIAN RADIATION MODEL**

**Emma Bradford (Dr. Heidrun Schmitzer)**

**Department of Physics**

Planetary radiation is caused by high-energy particles becoming trapped by a planet's magnetic field. This radiation can cause detrimental effects on a spacecraft by penetrating the spacecraft's shielding which can then lead to damage to its electrical systems. By making a model for the radiation belts of Uranus one can find the intensity and location of the high-energy particles. With this information the spacecraft can then avoid the radiation belts or be built with shielding material in order to withstand the radiation's effects. The model was created by taking data from Voyager's LECP and TET particle detectors during the flyby of Uranus in 1986. Many aspects, however, need to be taken into account when creating the model such as the effects of the solar wind, the tilted axis of rotation, and the orbiting moons. Making the model consisted of analyzing data, graphing the energy vs. location, and using non-linear regression analysis to fit the data points, this analysis was then transferred into Fortran to complete the model. The model, U.B.RAD, includes a complete map of the radiation belts of Uranus at different energies, locations, and magnetic pitch angles for both protons and electrons. This model will now be used on future missions to Uranus to design the spacecraft shielding and its trajectory.



## **STUDYING THE TRANSFER OF OPTICAL ORBITAL ANGULAR MOMENTUM TO A HELICAL BACTERIUM**

**Dana Davis (Dr. Heidrun Schmitzer)**

**Department of Physics**

The purpose of this research is to study how the angular momentum of an optical vortex created by a 1064 nm laser is transferred to a helical shaped bacterium. When under the influence of a laser in optical tweezers, the helical shape of the bacteria causes it to spin in the trap. A spatial light modulator reshapes the beam and is twisted either into a left handed or right handed helix. This results in an optical vortex with a diameter which can be adjusted from roughly half a micron to three microns. The rotational speed of a helical bacterium in this type of optical trap should depend on the handedness of the vortex and the handedness of the bacterium being tweezed. When both the tweezing beam and the bacterium have the same handedness, a slight reduction in rotational speed should be observed; when the tweezing beam has the opposite handedness of the bacterium, a slight increase in rotational speed should be expected. We present our first experiments with magnetospirillum magnetotacticum and rhodospirillum rubrum.



## **FURTHER EXPLORATION OF THE WAVE ON A STRING**

**Brendan Gausvik (Dr. Marco Fatuzzo)**

**Department of Physics**

The intent of this research was to more thoroughly understand the evolution of standing waves along a string in the presence of damping forces for several initial wave profiles. A number of programs in Mathematica were developed to model the behavior of a the standing waves. These programs required that an initial wave profile be specified, and generated either a 3-D graph of the wave (a graph of x, y and t) or an animation of the string itself. Two approaches were used, one invoking the method of Fourier Analysis (breaking down the initial profile to a sum of sine and cosine functions) and the other using one of Mathematica's many built-in differential equation solvers. Upon completion, these programs did indeed generate the same results. Both of these programs were then used as a platform to create similar programs that would account for some amount of dampening. The only difference with these is that you must also include a dampening factor among the input values. Again, these programs generated the same results, demonstrating that both approaches, though mathematically very different, model the physical system equally well.



## **IMAGING BACTERIA GROWTH**

**Jenna Graham (Dr. Justin Link)**

**Department of Physics**

Bacteria are unicellular organisms which may cause disease. When bacteria grow in conjunction with an extracellular matrix they are known as biofilms. These biofilms are particularly sticky and adhere well to smooth surfaces; in addition they are extremely virulent against antibiotics. The development of biofilms interferes with proper function of medical devices such as catheters and prosthetics and can lead to nosocomial (hospital acquired) infections. Hospital acquired urinary tract infections (HAUTI) is a leading nosocomial diseases. These HAUTIs are caused by bacteria such as E. coli and Staphylococcus epidermis forming biofilms on smooth catheter surfaces. Using the interdisciplinary subject of biophysics, this research looks at one method in which physical tools can be used to investigate properties of biofilms. Specifically, the colony development of Staphylococcus epidermis was successfully imaged using atomic force microscopy.

## FLUID MANIPULATION UTILIZING ELECTROWETTING TECHNIQUES

Laura Kaiser (Dr. Marco Fatuzzo)

Department of Physics

The fraction of the pore space in rock occupied by a given fluid is called saturation. The relationship between saturation and capillary pressure for porous media is hysteretic between imbibition and drainage cycles. If the wetting phase saturation increases, the capillary pressure follows an imbibition curve, and, if the wetting phase saturation decreases, the capillary pressure follows the drainage curve. Due to this hysteresis, researchers have suggested that there is a third variable that should be considered called interfacial area per volume that removes the ambiguity in the capillary pressure - saturation relationship. Before the relationship can be explored in more detail, we first must be able to manipulate the saturation internally rather than externally. We used electrowetting techniques to manipulate the contact angle of a salt water drop. This technique affects the interfacial energy and, therefore, enables manipulation of the contact angles and saturation. Once mastered, the technique could be used to explore the effect of interfacial area per volume on micromodel systems.



## KINETIC ENERGY CONSIDERATIONS IN BALLISTIC TESTING

Lauren Lopez (Dr. Justin Link)

Department of Physics

Ballistics, the study of the motion of projectiles, has been a field of study for centuries and remains so to this day. In modern classical mechanics, Newton's laws of motion can be used to determine the behavior of both low- and high-energy projectiles while taking into account outside forces such as aerodynamic drag, wind, and the Coriolis Effect. With a focus on high-energy projectiles and practical application, equations of motion were derived and then used to plot the trajectories and calculate the change in kinetic energy for projectiles of varying size and mass.

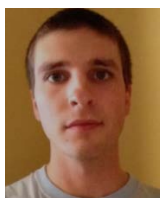


## MULTI-TOUCH TABLE USING FRUSTRATED TOTAL INTERNAL REFLECTION

Dillon Morris (Dr. Marco Fatuzzo)

Department of Physics

Multi-Touch Table using Frustrated Total Internal Reflection Dillon Morris (Dr. Marco Fatuzzo) Department of Physics There are three different types of touch screen technology; single touch, dual touch, and multi-touch. A screen with single touch capabilities can only take one touch input at a time. If a screen is using dual touch technology that means the screen can take up to two touch inputs at a time. Screens using multi-touch can handle multiple touch inputs at time. This first part of this project uses the properties of the total internal reflection of infrared light to build a screen with multi-touch capabilities into the surface of a table. In the second part, physical characteristics of the screen will be measured under different environmental conditions.



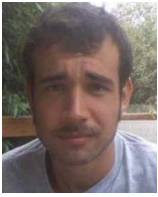
## AN INQUIRY OF SIRIUS UTILIZING ASTRONOMICAL SPECTROSCOPY

Will Thatcher (Dr. Marco Fatuzzo)

Department of Physics

The achievements of Astronomy over the past four hundred years have permanently changed humanity's views on existence. The 1500's brought about Copernicus' revolutionary model of a heliocentric universe, disrupting the center-stage idea of the earth's location in the universe. The 1600's brought about Kepler's Laws of Planetary motion, dismantling the idea that orbits are perfectly circular. Then, with the discovery in the 1800's that the chemical elements determined to be in distant stars are the very same that are present here on earth, humanity was faced with a new multitude of questions to be addressed concerning their place in the universe. Slowly the mystic picture of the universe that humanity had painted for itself for thousands of years was disintegrating in light of scientific discoveries. As an exercise to walk down the same path that so many did before me, I decided to direct my thesis towards astronomical spectroscopy, and more explicitly, exploring the binary star system, Sirius. Through conducting an analysis on the observed spectrum of a celestial body, several attributes can be determined, such as: chemical composition, average surface temperatures, as well as the velocity at which the two stars orbit about their center of mass.

## Department of Political Science



### **PRIVATIZATION AND THE STATES**

**William Burchett (Dr. Mack Mariani)**

**Department of Political Science**

The purpose of this paper is to run a fifty state analysis to assess whether states that have contracted with private prison companies have lower incarceration costs than states which do not contract with private prison companies. This study will compare prison costs in the 25 states that have contracted with private prison companies with the 25 states that do not. The data for this paper comes from the Bureau of Justice Statistics and the National Association of State Budget Officers. I hypothesize that states which utilize private sector companies for prison services will spend less than other states on a per-prisoner basis when taking into account other key demographic and social variables.



### **THE RELATIONSHIP BETWEEN INCOME, RACE AND VOTER DECISION**

**Nick Chesrown (Dr. Mack Mariani)**

**Department of Political Science**

Previous research indicates that income is a key factor that shapes a person's political views and voting patterns. This study examines the relationship between race, income and voting decisions. To what extent do African Americans from different income brackets vote differently? Is income a bigger factor for African Americans in congressional elections than presidential elections? Does the impact of income as a factor in voting decisions change over time? The data set I am using for this study is the American National Election Study. I examined the data with SPSS to look at the relationship between these variables. I hypothesize that when controlling for race we will find that white and black voters of similar income levels tend to vote more similarly than conventional wisdom suggests.



### **WHAT IS THE IDEAL AGE GAP IN HETEROSEXUAL, CAUCASIAN MARRIAGES?**

**Manisha Kaura (Dr. Mack Mariani)**

**Department of Political Science**

Disagreement exists about the ideal age gap in heterosexual, Caucasian marriages: some scholars think that men should be no more than 4.5 years senior to their wives, whilst others argue men should be 15 years senior to their wives to maximize male longevity. This study utilizes logistic regressions to hold fifty-one demographic, personality, biological, and relative attractiveness variables constant, to determine if age differences in marriage (heterogamy) allow for marital stability. The researcher predicts that age heterogamy will have a strong, positive relationship with marital stability. That is, as age differences increase between a married couple, their likelihood of divorce and infidelity will decrease. Given that husbands enter into a midlife crisis when their wives reach menopause, ascertaining what age gap would confer a stable, divorce-free, and infidelity-free union is of practical and epidemiological significance.



### **CATHOLICISM AND POLITICS: COMPARING THE POLITICAL VIEWS OF CATHOLICS WITH THE CHURCH'S POLITICAL TEACHINGS**

**Nick Lampe (Dr. Mack Mariani)**

**Department of Political Science**

In the last 20 years there has been increasing discussion of a potential disconnect between the Catholic Church and its members on several political issues. While it is impossible to find an issue that all Catholics will agree on, there seems to be a perception that many Catholics disagree on the Church's position on issues such as gay marriage and abortion. In this study I will be exploring the political views of Catholics to see how much disagreement there is between the Church and its members. I will be using the ANES dataset to look at Catholic opinions on several issues, including gay marriage, abortion, gun control, and the death penalty. I will look at these opinions time to see how opinions of Catholics have changed. In addition, I will also look at these issues in relation to other factors, such as gender and frequency of church attendance.

## Department of Psychology



### **THE RELATIONSHIP BETWEEN SPIRITUAL INTEGRATION, PERCEPTION AND MOOD FLUCTUATION**

**Kaela Allton (Dr. Kathleen Hart)**

**Department of Psychology**

In recent years, researchers have conducted studies on the influence of religious and spiritual processes on behavior, cognition, and both physical and mental health. Yet such research has indicated many inconsistencies in regards to the specific effects of spiritual processes on humans. The purpose of this study was to examine whether one's integration of religion into his or her life influenced the extent to which external stimuli affected one's mood. The hypothesis was that the mood of individuals with high spiritual integration would change more drastically after observing an emotionally-charged stimulus when compared to individuals with a lower level of spiritual integration. Participants (N=196) completed three questionnaires on current affect, daily spiritual experience, and empathy, watched a short, mood-inducing video clip, answered questions about the video, and completed two questionnaires on mood and demographic information. Repeated measures ANOVAs were calculated to examine the effects of spiritual integration on positive and negative affect. The analyses indicated a significant difference in negative affect among pre-post video scores by spiritual integration. Thus, participants' spiritual integration significantly influenced their general mood, yet further research could study the role on empathy in the relationship between spiritual integration, perception, and mood fluctuation.



### **SERVICE LEARNING: IMPACT ON SELF-ESTEEM AND SELF-EFFICACY**

**Olivia Daley (Dr. Kathleen Hart)**

**Department of Psychology**

Service learning is becoming a part of education today because of its multiple benefits it provides. As a new concept, not much prior research has been made on this topic. The current study examined the relationship between service learning, self-efficacy and self-esteem, and service experience. This study explored to find whether or not a service learning task had an impact on self-efficacy and self-esteem. It also asked whether or not service experience frequency had an impact on self-efficacy and self-esteem. Ninety-eight college undergraduate students completed a sorting task along with two questionnaires. There was no significance found between service learning and self-efficacy and self-esteem scores. There was also no significance found between the service experience frequency and self-efficacy and self-esteem scores. The findings indicate that the present service learning task nor service experience frequency increase self-efficacy or self-esteem.



## **A WHOLE DIFFERENT BALL GAME? COMPARISON OF PORTRAYALS OF ALCOHOLIC BEVERAGES AND USAGE IN COMMERCIALS DURING NFL AND NBA BROADCASTS**

**Gabrielle Falco, Abigail Maristela, Trevor Morris, Jessica Petri (Dr. Christian End)**

**Department of Psychology**



Inconsistent conclusions regarding the relationship between sports fandom and alcohol consumption have left unanswered questions regarding how sports fans and nonfans of various sports differ in their alcohol use patterns. To quantify fans' exposure to alcohol, commercial content during televised NFL and NBA broadcasts was analyzed. Overall, there were 119 and 125 alcohol-related advertisements out of 1343 commercials in 37 hours of NFL coverage and 1243 ads in 38 hours of NBA coverage, respectively. Follow up chi-square tests of independence indicated that commercials differed significantly by source in the amount and type of alcohol portrayed (wine, beer, liquor, mixed drinks) and in the race and location of persons depicted consuming alcohol in commercials. Over 80% of commercials depicting alcohol use during NFL games showed beer while commercials during NBA games depicted a much different range of alcohol use, with a significantly greater percentage of commercials depicting wine, liquor, and mixed drinks. In addition, a significantly greater number of Caucasians were portrayed consuming in commercials during NFL games than during NBA games, which featured significantly more Hispanic drinkers. These findings are key to understanding how the media may be publicizing an image of the "typical" NFL or NBA fan that is too close to call.



## **STICKS AND STONES MAY BREAK MY BONES, BUT WORDS CAN ACTUALLY HELP ME? BENEFIT-FOCUSED VERSUS EMPATHY-FOCUSED WRITING ON FORGIVENESS**

**Miranda Gerber (Dr. Cindy Dulaney)**

**Department of Psychology**

The purpose of this study was to examine the effects that benefit-focused and empathy-focused writing has on the forgiveness level of an interpersonal transgression. Participants were instructed to reflect on their most recent interpersonal transgression. Next, they completed a forgiveness measure, which assesses three dimensions of forgiveness: avoidance, revenge, and benevolence. The participants then wrote for 20 min regarding the transgression with either empathy-focused, benefit-focused, or a combination of benefit and empathy focused writing. Following the writing exercise, participants completed the forgiveness measure again. Results indicated that all three writing techniques decreased revenge scores. However, empathy-focused writing technique also decreased avoidance scores more than the other two writing techniques. These findings indicate that writing techniques may influence forgiveness, which may aid in the process of forgiving others and personal healing.



## **ATTAINING OPTIMAL PERFORMANCE THROUGH MENTAL TECHNIQUES**

**Lauren Heap (Dr. Kathleen Hart)**

**Department of Psychology**

Self-talk in the form of positive self-affirmations (e.g., “[I am confident in my reading ability]”) has been shown to help improve performance and promote change towards the desired goal or behavior (Bergman, Ferrer, Harris, Klein & Shmueli, 2012). Performance expectancies are the thoughts and beliefs of one’s ability towards a future task (Dickhäuser & Reinhard, 2011). Separately, positive self-affirmations and enhanced performance expectancies have been demonstrated to improve performance. The present study evaluated performance following these mental techniques by randomly assigning 98 participants to one of four conditions (positive self-affirmation only; enhanced performance expectancy only; enhanced performance expectancy plus positive self-affirmation, and no manipulation [control]). All groups completed a two-minute word search task as a measurement of performance. A one-way analysis of variance (ANOVA) found significant differences across groups; paired comparisons indicated that participants in the affirmation condition found significantly more words than participants in the combined condition and the control condition. Additionally, the enhanced performance expectancy condition participants identified significantly more words than those in the combined condition. The results suggest that positive affirmations and enhanced performance expectancy are more effective in improving performance separately than when they are combined, with positive affirmation as the most effective performance enhancement technique.



## **EFFECTS OF THE BOSTON BOMBING ON FEAR OF CRIME AND CONFIDENCE IN CAMPUS SECURITY**

**Sarah James (Dr. Cynthia Dulaney)**

**Department of Psychology**

In light of current events, particularly the April 2013 Boston Marathon bombing, the present study examined students’ fear of crime victimization on a college campus. Participants viewed either a video news clip of the Boston bombing or a neutral video clip of the Cincinnati Flying Pig Marathon and responded to a survey about fear of crime victimization and confidence in their university’s emergency response plan. Contrary to the hypotheses, there were no significant differences between participants who viewed the bombing versus the neutral videos on fear of crime victimization or on confidence in campus security. These findings suggest that students may be experiencing desensitization to violence portrayed in the media or optimistic bias regarding their risk of personal victimization. Findings also indicated that students had generally low confidence in their campus emergency response plan. Future research is needed to better understand students’ perceptions of crime victimization and their campuses’ emergency response plans.



## **DEFENDANT INFORMATION ON JUDGMENTS OF SIMULATED JURORS**

**Olivia Robinson (Dr. Kathleen Hart)**

**Department of Psychology**

The relationship between defendant information and the nature of judicial judgments was examined through the use of simulated sentencing task. Undergraduate students (N = 98) were given one of four possible vignettes to read and evaluate. These vignettes, presented as case files, described the same criminal offense and circumstances, varying only in the defendant’s race and described socioeconomic status. Participants then rated the defendant on attributed personality traits, perceived culpability, and assigned a punishment. No significant differences emerged between groups in the measures of perceived culpability or punishment severity, but 6 of the 12 attributed personality traits significantly differed across groups. These traits were: vulnerable, violent, dangerous, hostile, unlikable, and bad. Post hoc paired comparisons indicated that the Caucasian defendant of low socioeconomic status received more negative trait ratings than any other defendant. This finding stands in contrast to previous research, which has found that African-American defendants were more likely to be negatively evaluated and punished more severely. Further research in this area would be beneficial in an effort to understand the reason for this trend.



## **EXPECT THE WORST, HOPE FOR THE BEST: THE CONSEQUENCES OF VISUALIZING SUCCESS**

**Jessica Taylor (Dr. Kathleen Hart)**

**Department of Psychology**

When pursuing a goal, there are various visualization strategies an individual can employ to assist in attainment of the goal. Examples of visualization strategies include positive fantasy (thinking of the future in an idealized manner) and positive reality (thinking about the future in a realistic manner) (Oettingen & Mayer, 2002). Research supports the notion that individuals who employ positive fantasy visualization are less successful in achieving their goal than individuals who employ positive reality visualization (Kappes & Oettingen, 2011; Oettingen, Honig, & Gollwitzer, 2000). To determine the impact of visualization on success, 71 undergraduate participants read prompts instructing them to employ either positive fantasy or positive reality visualization before completing a 10-item math test. The math test performance of the two groups did not differ significantly, providing no evidence of an advantage of one technique over another. Further, the math test performance of men versus women did not differ significantly, providing no evidence that men and women respond to the techniques differently. These findings were not consistent with previous. Future research may be able to demonstrate under what circumstances each technique is most effective as well as whether or not men and women respond differently to each technique.

## **Department of Social Work**



### **A DEEPER MEANING OF KNOWLEDGE: PHILOSOPHY'S PLACE IN SOCIAL WORK**

**Genevieve Hager (Shelagh Larkin)**

**Department of Social Work**

The principle of “Knowledge versus Belief” conceptualized by Saint Augustine was applied to the concept of knowledge in social work education. A model is presented that expands the current understanding of knowledge’s role in practice. This supports the liberal arts base, particularly Philosophy, in the intellectual base of the profession.

## **Department of Sociology**



### **GROCERY SHOPPING AMONG THE FOOD INSECURE**

**Anne Geoghegan, Aaron Knestrict, Stacey Radziwon, Tina Toquica (Dr. Kandi Stinson, Michelle Early)**

**Department of Sociology**

Grocery shopping is a food procurement strategy important for understanding the population living in a food desert. Previous research has found differences in shopping behaviors between men and women, and among household structures (Ahuja, Capella, Taylor, 1998; Blake et al., 2009). However, previous research has not considered gender differences or household structure differences in grocery shopping in a population that is food insecure and/or living in a food desert. A quantitative survey that included questions about grocery store shopping was administered to clients of the Saint Vincent DePaul Food Pantry over the course of six weeks. Research found that household structure and gender affect the food procurement strategies of people in a food insecure situation. It was found that household structure influences who is more likely to be the primary shopper. Gender differences influence the type of store used to grocery shop. The research provides a better understanding of the population served by SVDP and gives insight to the particular struggles that food insecure populations face when living in a food desert.





## ALTERNATIVE METHODS AND COPING MECHANISMS FOR LOW-INCOME FOOD PANTRY CLIENTS

Nicholas Bunch, Emily Herskowitz, Abigail Maristela, Jon Sydeski (Dr. Kandi Stinson)

Department of Sociology

This research focuses on the coping mechanisms and food-procurement strategies employed by clients of local Cincinnati food bank, St. Vincent DePaul. Following previous research, coping strategies are defined as specific and unique methods in which low-income households stretch out their food budget when their food budget is insufficient. Resources, such as income, government assistance, and methods of access, determine a household's condition and can limit or aid their procurement strategies, or methods of obtaining food. Some have to resort to alternative methods of food procurement, which is any method other than purchasing food at a store, such as stealing, getting food from friends, and growing one's own food. This research focuses on the the relationship between the amount of resources a household has and the utilization of other strategies, rather than purchasing food at a store, to make a household's food budget last longer. A survey was distributed to SVDP food pantry clients (n=106) asking questions on a variety of topics including grocery shopping practices, coping strategies, and household type. The results of this research indicate that those with fewer resources tend to utilize more coping strategies and alternative methods of food procurement. The goal is that this research will aid St. Vincent DePaul in better serving their struggling clients who must resort to alternative methods of procurement.



## Department of Sports Studies

### TRACK SPRINTER WITH PATELLAR TENDON PAIN

Crista Rosborough (Dr. Lisa Jutte)

#### Department of Sport Studies - Athletic Training

Background: A female track sprinter complaining of anterior left knee pain below the patella. Presented with swelling in the knee and tenderness over the patellar tendon. Her testing showed weakness over the patellar tendon and she had limping. Differential Diagnosis: patellar tendonitis, patellar femoral syndrome, osteochondral defect Treatment: Patient originally treated for patellar tendonitis. Strength training initiated to decrease symptoms of patellar tendonitis. Patient rested for a month after track season then began training again and pain still present. Patient had continued doing exercises throughout time off training but was limited due to access of facilities at home. Continued to have pain and scheduled an appointment at the Cleveland Clinic. Doctor at Cleveland Clinic evaluated and she received an X-ray and Ultrasound. Upon evaluation of image testing a 30-40% vertical tear in distal tendon was found and the doctor recommended platelet rich plasma (PRP) injections. Patient care was transferred to the team orthopedic doctor at Xavier based on patients return to school from Cleveland to Cincinnati. He reviewed case at the appointment used the diagnostic ultrasound for placement and to confirm previous diagnosis. The diagnosis was confirmed and he proceeded with the PRP injections received four months since season had ended. Patient was partial weight bearing on the day of the procedure and iced multiple times throughout the day. The patient experienced soreness over injection site and began range of motion exercises with tolerance, and continued partial weight bearing on crutches the next day. Nine days after procedure patient off crutches with no pain only slight tenderness over the middle 1/3<sup>rd</sup> of the tendon. Patient continues on an exercise program including strengthening the muscles. Two weeks after the procedure the team doctor follow up and schedule next PRP injection 4 weeks from the first injection. The patient proceeded with strengthening exercises for the quad hamstrings and hips. Short arc Quads were difficult after the first injection but she did these as tolerated. At the next injection Xavier's team doctor administered the PRP injection. He stated that there was more blood to the area. The patient found that this injection was more painful. The team doctor follows up with her four weeks from second injection to determine if another one is needed. Uniqueness: The tear in the patellar tendon is not horizontal it is vertical through the tendon. The patient's tibial tuberosity is also lateralized and she has patella alta. This predisposes her to different overuse injuries because of the stress she puts on from weight lifting and certain movements. The tibial tuberosity also increases risks of tearing an ACL. Conclusion: The patient continues strengthening in her legs. In order to prevent further damage the patient refrains from movements that strain the tendon including squatting and cutting. This constraint will only limit her in her training and not directly in her event in track. If the next PRP injection does not alleviate the pain then another PRP injection may be needed

## **Celebration of Student Research 2013 Presentation Schedule**

### **CLC 405**

#### ***Classics & Modern Language***

- 1:45 Lee Little FRESH, FREE, STRONG UND TRUE: THE TURNER MOVEMENT IN CINCINNATI AND NORWOOD
- 2:05 Matthew Schreiber CHARACTERISTICS OF EASTERN-EUROPEAN JEWS: THEIR CULTURE, LANGUAGE, SOCIETY, AND HISTORY AND THE PROBLEMS WITH CULTURAL ASSIMILATION IN THE 19TH AND EARLY 20TH CENTURIES
- 2:25 LeeAnn Scherbauer A MOVEMENT TOWARD MULTICULTURALISM: A CASE STUDY OF TURKISH MIGRANTS IN GERMANY

### **CLC 406**

#### ***Biology & History***

- 1:45 Henry Malachi, Cameron Rolle, David Sheron SCAVENGER ACTIVITY BY DECOMPOSING CARRION IN AN URBAN ENVIRONMENT
- 2:05 Armand Cann, JJ Carr, Chris Dobbs, Kevin Perkins, Molly Sterling FACTORS AFFECTING LARVAL MOSQUITO POPULATIONS (FAMILY CULICIDAE) IN SOUTHWESTERN OHIO
- 2:25 Tim Holliday "THE DEVIL IN THE SHAPE OF A PLAINTIFF": WITCHES, SLANDER, AND INTERPERSONAL POLITICS IN SEVENTEENTH-CENTURY MASSACHUSETTS

### **CLC 412 – Kennedy Auditorium**

#### ***English & Philosophy***

- 1:45 Zach Aliberti PERSISTENT URBAN POVERTY IS COMPLEX
- 2:05 Taylor Beckham A REALISTIC DEPICTION OF SLAVERY IN "UNCLE TOM'S CABIN"
- 2:25 Rachael Harris ME TALK PRETTY AT THE CARNIVAL: AMERICAN HUMORISTS DAVID SEDARIS AND JAMES THURBER
- 2:45 Michael Petraný MECHANISM, INTENTION, AND A BLADE OF GRASS: KANT AND DARWIN ON TELEOLOGY IN NATURE
- 3:15 Donna Szostak HANNAH ARENDT: THE POLITICS OF JUDGMENT

### **CLC 5<sup>th</sup> Floor Honors Lounge**

#### ***HAB***

- 1:45 Donald Young BRITONS AND EMPIRE IN TACITUS AND CASSIUS DIO
- 2:00 Rachel Bier OVID'S INSIGHT INTO THE MINDS OF ABANDONED WOMEN
- 2:15 Kelly Bunting HOW NOVEL IS THE NOVEL? THE CONTINUITY OF THE NOVEL GENRE
- 2:30 Thomas Finke AUGUSTINE AND JOHN PAUL II ON THE GOODS OF MARRIAGE: PROLES, FIDES, ET SACRAMENTUM
- 2:45 Jensen Kolaczko LIFT, EAT, COMPETE: ATHLETICS IN ANCIENT GREECE AND MODERN AMERICA
- 3:00 Sean Minion DESCENDANTS WITH DADDY ISSUES: FATHERLESSNESS IN GREEK EPIC AND TRAGEDY
- 3:15 John Prijatelj TURNING THE WHEELS OF EMPIRE: THE STANDING ARMY AND IMPERIAL SUCCESS IN ROME AND BRITAIN
- 3:30 Kelly Schmidt PRIVACY IN THE ILIAD
- 3:45 Anna Wiley Asclepius, M.D.? The Ancient Greeks and Integrative Medicine
- 4:00 Brendan Chisholm THE PSYCHOPATHOLOGY OF EVERYDAY ATHENS: EURIPIDES ON THE FREUDIAN COUCH

## **Celebration of Student Research 2013 Presentation Schedule**

### **CLC 308**

#### ***Philosophy, Politics, & the Public***

- |      |                  |  |
|------|------------------|--|
| 1:30 | Ricky Garcia     | "I JUST WANNA BE SUCCESSFUL": THE AMERICAN DREAM AND ITS INNATE AMBIGUITY  |
| 1:45 | Erin King        |  |
| 2:00 | Amanda Fisher    | THE RELATIONSHIP BETWEEN THE ENVIRONMENT AND THE AMERICAN DREAM IN THE SHAPING OF THE NATION   |
| 2:15 | Jonathan Keillor | AN ANALYSIS OF THE BRITISH BOMBINGS ON GERMANY DURING THE SECOND WORLD WAR   |
| 2:30 | Zach Alberti     |  |
| 2:45 | Kelsey Reed      | A POLICY OF TORTURE  |
| 3:00 | Jimmy Geiser     | A JUSTIFICATION FOR ADOPTING EDUCATIVE PUNISHMENT AND ITS IMPLICATIONS FOR THE UNITED STATES' PENAL SYSTEM                             |
| 3:15 | Olivia Earls     | ON PRODUCING GREAT PERSONS: DEMOCRATIC EDUCATION IN THE UNITED STATES  |
| 3:30 | Dan Graziano     | THE TRIALS AND TRIBULATIONS OF FREE MARKET MEDIA   |
| 3:45 | Mike Hills       | TESTING AND ITS DISCONTENTS: THE BENEFITS OF INDIVIDUAL STUDENT ASSESSMENT IN THE POST-'NO CHILD LEFT BEHIND' ERA IN FEDERAL EDUCATION |

### **CLC 309**

#### ***Philosophy, Politics, & the Public***

- |      |                  |  |
|------|------------------|--|
| 1:30 | Owen Raisch      |  |
| 1:45 | Rahiel Michael   | COLLECTIVE ACTION FOR THE PUBLIC GOOD DURING THE PROGRESSIVE ERA: REDISCOVERING CIVIC ENGAGEMENT IN AMERICAN DEMOCRACY |
| 2:00 | Pat Schlembach   | BEFORE PRO-LIFE AND PRO-CHOICE: PROGRESS AND THE DEVELOPING CONCEPTION OF CHILDHOOD, 1500-1900                         |
| 2:15 | Sean Cahill      | THE SHORTCOMINGS OF NEGATIVE LIBERTY: CONTEMPORARY CONSERVATISM IN FEDERALIST AMERICA                                  |
| 2:30 | Matt Schreiber   | THE OFF-COLOR HISTORY OF IMMIGRATION: RACIAL DISCRIMINATION, IMMIGRATION, AND THE JOHNSON-REED ACT OF 1924             |
| 2:45 | Andrew Fuller    | THE NEW RIGHT AND PERSPECTIVES OF THE AMERICAN WORKING CLASS   |
| 3:00 | Grace Badik      | COMMUNITY ORGANIZING: A PATH TOWARDS DEMOCRATIC ENHANCEMENT IN POST-COMMUNIST EUROPE                                   |
| 3:15 | Emily McLaughlin | SCIENCE FICTION AND THE MODERN READER IN WALTER MILLER'S A CANTICLE FOR LEIBOWITZ AND MARGARET ATWOOD'S ORYX AND CRAKE |
| 3:30 | Rosalynd Erney   |  |
| 3:45 | Katie Wiggins    |  |
| 4:00 | Matt Keyes       | CONSISTENCY IN CHANGE: THE LEGACY OF THE CHARTER MOVEMENT IN MODERN CINCINNATI POLITICS                                |