16th Annual

Student Research and Fine Arts Conference
12pm - 6:15pm March 18
JSAC Ballroom
Summerville Campus

Phi Kappa Phi

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The National Honor Society of Phi Kappa Phi

Established in 1897, The Honor Society of Phi Kappa Phi is a century-old, non-profit organization that recognizes and promotes academic excellence in all disciplines of higher education. The society was founded to cultivate a deep appreciation and respect for scholarship and is convinced that in recognizing and honoring those persons of good character who have excelled in scholarship, in whatever field, it will stimulate others to strive for excellence. With more than one million members from across the globe and over 300 chapters located on university campuses throughout the United States, Puerto Rico and the Phillipines, Phi Kappa Phi is among the oldest and most respected academic honor societies. Students elected to membership in Phi Kappa Phi include the upper 10 percent of last-term juniors and the upper 10 percent of seniors, along with outstanding graduate students, faculty and alumni.

Welcome From The President

It is a pleasure to welcome you to the 16th annual Phi Kappa Phi Student Research and Fine Arts Conference at Georgia Regents University.

More than 100 years ago, a new honor society was formed to recognize excellence in all academic disciplines. It adopted as its motto the Greek words "Philosophia Krateito Photôn," which means, "Let the love of learning rule humanity."

Here at Georgia Regents, we strive to instill a lifelong love of learning in all of our students. We value and encourage discovery, creativity, and innovation across a broad range of subjects and disciplines — from science to education, from history to social work, from marketing to the visual and performance arts, and so much more. Our expanding research portfolio provides students research opportunities at both the graduate and undergraduate levels in nearly every program. This annual event is a wonderful opportunity for our students to showcase the love of learning they each embrace.

I’d like to thank the many volunteers, including faculty, community members, and students, whose hard work made this conference possible. And congratulations to all of our exemplary student presenters and performers — you make us proud.

Ricardo Azziz
President, Georgia Regents University
CEO, Georgia Regents Health System

Conference Planning Committee
Maryska Connolly-Brown, Co-Chair
Trinanjan Datta, Abstracts
Tadd Patton, Judging
Jessica Reichmuth, Facilities
H. David Hunt, Judging
Sabina Widner, Abstracts
Rick Davis, Erica Ruggles, Kaitlin Keller, and Savannah Maddox, Publications

Faculty Judges
Amy Abdulovic-Cui, Biology
Pachiapan Arjunan, Periodontics
Jennifer Bradford, Biology
Will Bryant, Communications
Tom Colbert, Physics
Tom Crute, Chemistry
Gabor Csanyi, Vascular Biology
Sanjeev Dalela, Anesthesiology
Sam Hardy, Educational Leadership
Steve Harris, SRNL
Julie Quentin Hartmann, Psychology

Andy Hauger, Physics
John Hayes, History
Caryl Hess, Leadership Development

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John Hayes, History
Caryl Hess, Leadership Development

Edgar Johnson, Communications
Michelle Johnson, Psychology
Iryna Lebedyeva, Chemistry
Caroline McKinnon, Behavioral Nursing
Laurence Miller, Psychology

Lee Nigg, SRNL
Sharad Purohit, Biotechnology and Genomic Medicine
Eugenia Sabatini, Biology
Nilkantha Sen, Neuroscience
Michael Stefanek, Psychology
Richard Topolski, Psychology
Sarah White, AVP, Research Administration
Faith Wiley, Biology
Eric Zuckerman, Chemistry

Faculty Moderators
Barbara J. Mann, GRU Libraries, Head Librarian
Erin Prentiss, GRU Libraries
Sabina Widner, Psychology
Sandrine Catris, History
Jessica Reichmuth, Biology
Nathan Yanasak, Radiology
Paulette Harris, Education
Tadd Patton, Psychology
**Schedule of Events**

**Opening Ceremony**
JSAC - Ballroom, 12 pm - 12:40 pm
12 pm - 12:05 pm: Welcome from Dr. Pam Hayward, President PKP Chapter 324
12:05 pm - 12:10 pm: Welcome Address, Dr. Carol Rychly, Vice President of Academic and Faculty Affairs
12:10 pm - 12:40 pm: Student Keynote Address, Ugochukwu "Francis" Okechukwu

**Poster Session**
JSAC - Ballroom, 12:45 pm - 1:50 pm

**Oral Symposia 1**
**Session 1**
Isn’t it Ionic? Bicyclic analogues to predict cross-coupling regioselectivity
JSAC - Butler, 2:00 pm - 3:00 pm

**Session 2**
The Strife Aquatic: A musical about rats, drugs, evolution, and recombinant plasmids
JSAC - Ballroom, 2:00 pm - 3:15 pm

**Session 3**
Southeastern superheroes: What perceptions of gender and existentialism teach us
JSAC - Hardy Room, 2:00 pm - 3:00 pm

**Session 4**
Dragún and Herzog debate the merits of music and ROPE burns in Nazca
JSAC - Coffeehouse, 2:00 pm - 3:15 pm

**Oral Symposia 2**
**Session 5**
Mud crabs and birds enjoying a beer at the corner of Stem Loop and Fission Drive
JSAC - Butler, 3:30 pm - 4:45 pm

**Session 6**
Putting a spin on surface tension in the toroidal moment is pretty metal
JSAC - Hardy Room, 3:30 pm - 4:30 pm

**Session 7**
Buzzing around the Medieval faire dressed as a spy isn’t very cultured
JSAC - Coffeehouse, 3:30 pm - 4:30 pm

**Conference Reception**
JSAC-Ballroom, 5:00 pm - 6:15 pm
5:00 pm - 5:15 pm: Musical selections by the GRU Opera and Musical Theater Ensemble and the GRU Women’s Ensemble, under the direction of Patti Myers
5:15 pm - 5:30 pm: “Cindy and Julie,” a play by Bruce Kane
5:30 pm - 6:00 pm: Faculty Keynote Address, Michael "Cowboy Mike" Searles
6:00 pm - 6:15 pm: Awards Ceremony
6:15 pm - 6:30 pm: Pictures of Student and Faculty Sponsor Award Winners

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**Keynote Speakers**

**Ugochukwu ‘Francis’ Okechukwu**

**Research and Development: Creating the Future Today**

Francis Okechukwu is a software developer, researcher and entrepreneur. He is a graduate student at the Georgia Institute of Technology in the College of Computing, with a specialization in Machine Learning. He currently conducts research on creating medical devices controlled by mobile applications, and swarm robotic machine learning systems using computer vision technologies. His recent TED Talk shared the message that all of us can “Make the Impossible Possible.”

Francis has numerous mobile apps published on the Apple App Store and has co-founded multiple tech startups, spanning both Africa and the United States.

**Michael “Cowboy Mike” Searles**

**Following the Trail of a Black Cowboy: The Researcher’s Challenge**


In addition, “Cowboy Mike” – as he is known to the students, faculty, and the Augusta community – has given over 500 public presentations on African American history and the Black West in public schools; colleges and universities; and national, civic, and service organizations. He is a supporter of not only history, but also the fine arts in Augusta, which has included service on the Board of Directors for the Augusta Opera and the Board of Trustees for the Gertrude Herbert Institute of Art. He continues to be actively involved in education, historical research, and the arts.
**Live Performances**

Music:
**Musical Selections Performed by the GRU Opera and Musical Theater Ensemble and the GRU Women’s Ensemble**

Directed by Patti Myers

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Play:
**“Cindy and Julie”**

Written by Bruce Kane

Directed by Katie Crenshaw

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Cast:
Julie: Bailee Walton
Cindy: Amanda Dojack
Lady M.: Caroline Grant

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**Poster Session**

**JSAC- Ballroom**

12:45 PM - 1:50 PM

**Synthesis of Ciprofloxacin-Based Drug Delivery Systems**
Alexander Plotkin, Lin Chen, Genevieve Coe, and Kelsey Moore

Faculty Advisor: Iryna Lebedyeva, Department of Chemistry and Physics

The fluoroquinolones are a family of broad spectrum, systemic antibacterial agents that have been used as therapeutic agents for respiratory and urinary tract infections. Ciprofloxacin is one of the most used representatives of fluoroquinolone drugs. Ciprofloxacin is active against a wide range of aerobic gram-positive and gram-negative organisms and are believed to act by inhibition of type II DNA topoisomerases (gyrases) that are required for synthesis of bacterial mRNAs (transcription) and DNA replication. One of the major patient complaints during their treatment with ciprofloxacin is acid or sour stomach. This project is aimed at prevention of the ciprofloxacin release in the stomach by conjugating it to the branched polycarboxylic acid. Ciprofloxacin is conjugated to the cis,cis,cis,cis-1,2,3,4-cyclopentatetracarboxylic acid via flexible and biodegradable amino acid and peptide links.

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**Effects of a Suicide Prevention Program**
Amanda Terrell

Faculty Advisor: Jessica Ziemboski, Department of Sociology, Criminal Justice, and Social Work

Suicide is the leading cause of death among our active-duty armed military forces with an increase suicide rate per year. We aimed to find an effective way to make an impact on that dilemma of active-duty militant suicide through a suicide prevention program that focused on positive coping, support and image. We found that certain factors strongly correlate with preventing suicide.

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**Quinceañera! The Transformation to Womanhood**
Sonja Andrews

Faculty Advisor: Heather Abdenur, Department of History, Anthropology and Philosophy

This study will analyze the Latino ritual of the quinceañera. Specifically we will analyze the relevance of this coming of age ceremony. The research will be done by evaluating a various scholarly documents that explain the ceremony. The research will also include pictures of significant parts of the ceremony. This study is important in the United States when Latino women and girl are marginalized this celebration reminds them of their importance in society.
Sodium fluoride is a toxic, highly electronegative compound found in public drinking water, toothpaste, produce, and pharmaceuticals. As a result of fluorine’s tendency to gain an eighth electron to become stable NaF acts as a free radical within cells and will take electrons from molecules with only one electron in their valence shell. We believe this tendency may cause NaF to take electrons from sodium molecules within cells and change the charges within cells. It is very important that certain cells, like neurons, maintain a certain internal charge in relation to their surrounding environment to function properly. The charge altering effect on neurons may cause or contribute to dementia and specifically Alzheimer’s. The research we are conducting aims to explore the effect NaF has on Saccharomyces cerevisiae budding yeast. We are exposing the cells to varying concentrations of NaF solutions and measuring viability and mutation frequency. Additionally, we are sequencing the URA3 gene of the mutant yeast that were exposed to NaF to identify the type of mutations the compound induces.

*Funding source: Department of Biological Sciences, Center for Undergraduate Research and Scholarship

**The Effect of Trauma on Alcohol Consumption and Anxiety-Like Behavior in Rats**
Tara Bowers, Suzanne Oellerich, and Jonathan Bice
Faculty Advisor: Tadd Patton, Department of Psychological Sciences

Disorders characterized by significant symptoms of anxiety, such as post-traumatic stress disorder (PTSD), are often accompanied by alcohol use disorder (AUD). Comorbidity between these two disorders are often severe and can be more difficult to treat than when either disorder occurs alone. Research using animal models have taught us a great deal about the underlying neural mechanisms of PTSD and AUD. One commonly used animal model of alcoholism, the alcohol-prefering (P) rat has been selectively bred to consume high levels of alcohol and demonstrate other characteristics often found in humans who suffer from AUD. For instance, P rats exhibit innately higher anxiety levels compared to their non-alcohol consuming counterparts (NP rats). It has been established that previous exposure to trauma increases the subsequent risk for developing AUD. However, the effects of trauma on alcohol consumption in P and NP rats have yet to be investigated. Here, we examined alcohol consumption and anxiety-like behaviors of P and NP rats before and after a stressful event. Our results show fundamental differences between these two specially bred rats in terms of reaction to stress and its impact on alcohol consumption. Our findings will be discussed in terms of the relevance of this animal model for stress-induced alcohol consumption.

*Funding source: Center for Undergraduate Research and Scholarship

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**ADHD AND INTERVENTIONS**
Helen Brown
Faculty Advisor: Jessica Ziembroski, Department of Sociology, Criminal Justice, and Social Work

This research investigates whether psychotropic medication, behavioral modification or the combination of both models is perceived as the most effective way of helping families and school officials to serve a child with ADHD. Discussion will cover possible ADHD resources available for parents, children and teachers. This study conducts survey research and interviews with parents and teachers in a local school system on the pros and cons of behavioral modifications as well as psychotropic interventions. The use of the Vanderbilt Assessment Scales (Wolraich, 2002) to diagnose ADHD will also be explored along with the extent to which the Vanderbilt Assessment Scales provide adequate information to educators and parents for intervention.

**IDENTIFICATION AND ANALYSIS OF GRAM NEGATIVE BACTERIA ON SPIDERS**
Shelby Buckner
Faculty Advisor: Cathy Tugmon, Department of Biological Sciences

When a spider bites, venom is a concern, but what bacteria on the spider could be introduced with the bite? In order to answer this question, a database of the type of bacteria found on spiders based on characteristics of a spider must be built. The purpose of this research was to identify gram negative bacteria collected from spiders in 2013, analyze the bacteria’s resistance or sensitivity to antibiotics, and compare this data to the spider’s environment and foraging methods: hunter vs. web. 29 gram negative bacteria were isolated from 12 hunting spiders and 14 web spiders collected from 5 different local areas of Georgia and South Carolina. I was able to identify 18 bacteria to the species level, 4 had a low percentage reliability in their identification, and 4 were not identified due to being a very rare biotype. All bacteria were tested for their antibiotic sensitivity to 43 antibiotics. Six of the bacteria showed an unusual resistance while 3 showed an unusual sensitivity to the antibiotics. Comparison of this data set with previous data sets will be discussed as well as implications for all of my findings.

*Funding source: Center for Undergraduate Research and Scholarship Mini Grant

**Birth Order and Its Effects on Achievement in Higher Education**
Jordan Cook
Faculty Advisor: Jessica Ziembroski, Department of Sociology, Criminal Justice, and Social Work

Though a significant amount of research has analyzed the relationship between birth order and outcomes such as academic achievement, the mechanisms by which these operate are yet unclear (Mancillas, 2006). Specifically, how birth order affects high school and college completion is the focus of this study, and how these effects may continue well into adulthood. The research will conduct analysis focused on adults who grew up with no siblings and the subsequent success that these particular adults experienced as compared to their counterparts. Their academic success is defined as not only graduated from high school, but also obtained a degree within higher education. This study focuses on a sample of family units composed of two parent families with one or multiple children in Georgia. A qualitative questionnaire will be the method used to obtain the data collected will be tested to determine if there is a correlation between a person growing up in a family with no siblings vs. any siblings and academic success in adulthood.

*Funding source: Center for Undergraduate Research and Scholarship
**Measurement of the Flow Rate in Electro-Coflow**

Zane Corder, Charlene Higdon, Camille Miller, and Jaleel Bolden  
Faculty Advisor: Josefa Guerrero Millan, Department of Chemistry and Physics

We used a glass-based microfluidic device to study the behavior of an electrospay process in the presence of a coflowing liquid. The electrospay process results from the finite conductivity of the liquid, which promotes the migration of charges in the bulk towards the bounding interface to screen the external electric field. However, since liquids are easy to deform, the normal electric field outside the liquid that results from the presence of this surface charge is able to stretch the meniscus away from its original spherical shape to a conical shape (Taylor cone). In these experiments, the flow rate of the liquid is small (few μl/h) and usually fixed with a syringe pump. In our experiments, the steps of the motor of the pump introduce a perturbation that makes the Taylor cone vibrate. The use of pressurized bottles to pump the liquids solves the problem but creates the need to quantify the flow rate. Flow meters are discarded due to the sensitivity of the experiments. We designed a code in Matlab that measures the drop production using edge detection techniques. The flow rate is calculated in the dripping mode as the volume of the emitted drops in a time interval.

*Funding source: Department of Chemistry and Physics

**Open versus Closed Adoption**

Brittney Denton  
Faculty Advisor: Jessica Ziembroski, Department of Sociology, Criminal Justice, and Social Work

This study explores the correlation between an adoptee’s emotional well-being and the type of adoption they experienced, either open or closed. It will look specifically at the advantages and disadvantages of both open and closed adoption. A research team will use interviews and focus groups to collect data, and make observations from a random sample of adoptees. Self-esteem, self-confidence, and behavior will be examined to determine the participant’s level of emotional well-being. This study hopes to gain further knowledge on adoption practices, which in turn makes information available to biological parents and adoptive parents. This allows the biological and adoptive parents to make decisions on adoption that is best for themselves, their families, and adoptees. The study postulates that children who experienced open adoption, with clear boundaries and understanding of their adoptive and biological parents, may tend to have healthier levels of emotional well-being.

**Varying PH Levels Found in Bottled Water**

Bailey Jean Fisher  
Faculty Advisor: Angela Spencer, Department of Chemistry and Physics

Enamel is a hard outer covering of the tooth and dentin forms the inside. Tooth decay occurs when bacteria on the tooth digest sugar and secrete an acid which dissolves the enamel or dentin. Saliva serves to protect the tooth by buffering the acidic environment to neutral pH 7, washing the teeth, and providing nutrients like Ca2+ that strengthen the enamel. Tooth decay in enamel begins at a pH below 5.5, and in dentin, below 6.8. Low salivary flow (dry mouth) can result in tooth decay from the low pH in the mouth. One remedy for dry mouth is to drink more water. Due to both taste and convenience, bottled water has become a standard for combating dry mouth. The purpose of this research is to measure the pH of generic brands of bottled water to determine which might be best for tooth health. The reported pH of name brand bottled water was used for comparative purposes. The pH of 8 different samples of bottled water was measured three times using a standard pH electrode. The pH ranged from 4.71 to 7.82, and all but two had a pH in the acidic range. Dry mouth patients should thus consider their water brand.

*Funding source: Department of Chemistry and Physics

**Complexation of Erbium by DTPA in Room Temperature Ionic Liquids**

Kiana French  
Faculty Advisor: Christopher Klug, Department of Chemistry and Physics

Room Temperature Ionic Liquids (RTILs) are unique materials, that are generally composed of bulky asymmetrical cations and anions, which can be tuned for different purposes by the choice of the component ions. Because of their varied ability, RTILs are being explored as possible replacements for hazardous organic phases in solvent extraction processes. For a proper solvent extraction, lanthanides must be separated from used nuclear fuel in advanced partitioning and transmutation schemes. To further investigate ionic liquids, erbium salts have recently been used with DTPA in ionic liquids, as well as in aqueous solutions, to study changes in the hypersensitive visible absorbance peaks. Additionally, electrochemical studies have been used to investigate reduction potentials for erbium (Er) in ionic liquids and to explore the possibility of reducing trivalent erbium to the divalent state for possible oxidation state adjustment in solvent extraction processes. Absorption spectra have shown nearly identical behavior for Er in the ionic liquids and in aqueous solutions, as well as a markedly lower solubility for Er upon addition of DTPA to the ionic liquid system. Cyclic voltammograms have shown multiple reduction peaks for Er; possible assignments will be discussed.

**Evaluating the Effects of Commercial Scent Attractants on Mammal Behavior and Populations at Cowden Plantation, Jackson, SC**

Katlyn Gill, Brad Minter, and Valerie West  
Faculty Advisor: Bruce Saul, Department of Biological Sciences

The primary purpose of this study was to observe the effects of commercial scent attractants on the behaviors of the mammal populations at Cowden Plantation near Jackson, SC. In this study, white-tailed deer (Odocoileus virginianus), feral hogs (Sus scrofa), coyotes (Canis latrans), bobcats (Lynx rufus), and raccoons (Procyon lotor) were observed responding to the following attractants: Bobcat Anal Glands, Coyote Urine, Bobcat Urine, and Imitation Catnip. Cuddeback (IR and Black Flash) trail cameras were placed at ten different locations in open and forested habitats to monitor species occurrences and reactions via pictures and videos. Scents were rotated once a week at each location, and all sites included one control week. In summary, each camera went through a five week rotation with a different scent (or a control) deployed each week. Population densities were measured based on the number of images captured with scents compared to images captured without scents. Animal behavior was monitored through video and categorized into four different scent reaction groups: Smelled, Repelled, Rubbed Against, and Tasted. The most mammal activity occurred around Bobcat Urine. Coyotes and bobcats reacted to the three animal scents in more open habitats, while other mammal species showed reactions in wooded or both habitats. The imitation Catnip had the most behavioral responses on feral hogs in both habitats.

*Funding source: Department of Chemistry and Physics, Center for Undergraduate Research and Scholarship, The Pamplin Student Research and Travel Fund

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The Effects of Maternal Incarceration and Childhood Outcomes
Tamara Gilyard
Faculty Advisor: Jessica Ziembroski, Department of Sociology, Criminal Justice, and Social Work

This research study explores the relationship between a mother’s incarceration and her child well-being. Family dynamics and relationship dyads are also explored in respect to the social constructionist and developmental perspectives. It examines the areas of childhood self-esteem and self-determination in relation to emotional and behavioral development. It considers what effects might involve from having a parent (mother) that is incarcerated. The data included in this study is from participant observations in group settings and surveys giving to teachers, caregivers, and guardians.

Synthesis of Quinolin-4-one Derivatives as Potential Inhibitors of HHV-6
Fatima Hassan
Faculty Advisor: Chad Stephens, Department of Chemistry and Physics

Human herpes virus (HHV-6) is the sixth member among the eight members of the human herpesvirus family. Similar to other members of this family, HHV-6 is known to have a period of latency where it remains dormant until certain conditions allow it to reactivate later in life. Reactivation in immunosuppressed individuals has detrimental effects where patients have suffered a variety of conditions such as hepatitis, pneumonia and encephalitis among other diseases. Currently, HHV-6 is treated with antiviral agents such as Ganciclovir, Cytovene and Foscavir. However, these drugs primarily target cytomegalovirus (HHV-5). Therefore, there is a need for drugs that selectively target HHV-6. Previously, we have developed bicyclic sulfone compounds that show good activity against HHV-6. The purpose of this research has been to synthesize novel quinolin-4-one analogues of the lead compounds where the sulfonyl group is replaced with a bioisosteric carbonyl group. The carbonyl has similar chemical properties as the sulfone group, however, the difference in geometric structure may provide drugs with better activity than the lead compounds. Recently, we have been able to synthesize some of these quinolin-4-one analogues by a multi-step approach, and these compounds are currently being tested for antiviral activity at the Rega Institute in Belgium.

The Single-Parent Home and Juvenile Delinquency
Kristi Henagan
Faculty Advisor: Jessica Ziembroski, Department of Sociology, Criminal Justice, and Social Work

This research examines how the family environment, including family structure, affects the incidence of juvenile delinquency in youth. Several aspects of parenting are tested, including the effect on youth of living in a single-parent household and deviant behavior. Family function, family transitions, parental controls, and parental relationships are also included as factors that may predict juvenile status offenses. Prior research has demonstrated that the characteristics of family life impacts whether adolescents come into contact with the criminal justice system (Demuth & Brown, 2004; Harper & McLanahan, 2004). This study adds to this literature by conducting in-depth face-to-face interviews with both parents and youth to reveal the experiences of those who are part of the juvenile justice system. Using Social Bond Theory, it is anticipated that the family environment of youth without strong attachments will be related to higher incidence of juvenile delinquency. The results support this hypothesis, particularly in terms of the family structure of single parent families.

It’s Getting Hot in Here: Mummichog response to variable temperatures and light exposure
Brianna James and Ima (Johnnie) Umoh
Faculty Advisor: Jessica Reichmuth, Department of Biological Sciences

Mummichogs, Fundulus heteroclitus, can tolerate a wide variety of temperatures and salinity concentrations. This ability makes them a model organism and they have been used in many studies ranging in the fields of toxicology, cancer biology, physiology, and endocrinology. The coastal environments in which they are found are subject to constant changes in temperature and salinity, and as climate change effects these regions, salinity and temperature are expected to depart from normal conditions. The purpose of this experiment was test behavioral responses such as motility and feeding, in response to varying light exposure and temperature. We hypothesized that increasing the water temperature the activity of the fish would also increase. Mummichogs were collected from coastal Georgia and South Carolina. Three tanks with 10 fish each were set up simultaneously: fish in extreme cold temperatures, fish in extreme hot temperatures, and a control. Fish activity was monitored for 3 months. Our initial results suggest mummichogs prefer warmer temperatures under regular lighting. Based on the literature, our results are similar to the described activity and feeding habits of the fish. As coastal environments change due to climate change, mummichogs appear to be within their physiological limits.
**Effect of Food Labeling, Weight Consciousness, and Gender on Eating Behavior**

Wanda Kimbrough  
Faculty Advisor: Sabina Widner, Department of Psychological Sciences

What, and how much, people eat can play an important role in weight control and health management. The purpose of this study is to test several aspects of the Food Choice Process Model (Furst, Connors, Bisogni, Sobal, & Falk, 1996), which proposes that food choice involves multiple global factors that vary in their degree of influence and interaction. Specifically, we seek to examine the effects of food labeling, weight consciousness, and gender on food consumption and the perceptions of the taste and healthfulness of a granola bar. Participants are randomly assigned to one of two granola bar conditions. We hypothesize that individuals who are high in weight consciousness will eat more of a “healthy” granola bar than of a “gourmet” granola bar, and that men will eat more than women regardless of the granola bar label. In order to gather data, participants are asked to take part in a market research study in which they taste and rate a granola bar product. Data collection began in fall semester and will be completed in time for the PKP conference. We hope that our data will contribute to a better understanding of what influences people’s healthy (or unhealthy) food choices.

*Funding source: Center for Undergraduate Research and Scholarship

**Do College Preparation Programs Really Impact College Readiness and Achievement?**

Wanda Kimbrough  
Faculty Advisor: Jessica Reichmuth, Department of Biological Sciences

College retention remains a significant concern in U.S. colleges and universities. Despite initiatives that have been put in place to address this problem, there is not a clear relationship between K-12 college preparation programs and retention and achievement in higher education. Although prior research exists on this issue, it remains unclear whether such programs have a clear effect. This study aims to show the impact of children receiving preparation for college and career(s) preparation in the school in Augusta, GA and Chicago, IL. This study also seeks to reveal the relevance in the school communities, and may offer strategies to manage cyanobacterial blooms.

**Is Microcystis aeruginosa chemically defended against a freshwater rotifer?**

Nicholas LaBon and Aaron Chase  
Faculty Advisor: Emily Prince, Department of Biological Sciences

Blooms of cyanobacteria are a threat to human health. The cyanobacterium Microcystis aeruginosa produces microcystins, non-ribosomal peptides that are hepatotoxins in mammals. Microcystins are hypothesized to defend M. aeruginosa against zooplankton, however, tests of this hypothesis produce mixed results. We clarify interactions between M. aeruginosa and the rotifer Brachionus calyciflorus. We found that B. calyciflorus fed M. aeruginosa as a sole diet died, likely because rotifers stopped eating. However, when M. aeruginosa was part of a mixed diet rotifer population increased faster than when a control food, even though M. aeruginosa was consumed in proportion to the amount offered in the diet. Results were the same whether a toxic or non-toxic strain was used. A test of microcystin coated on food indicated it did not decrease rotifer fitness, even at artificially high concentrations. Interestingly, when extracts of M. aeruginosa were coated on control food, rotifers died significantly sooner than those fed a control. Results suggest M. aeruginosa is not a good food for rotifers, but microcystin is not the cause. Instead, M. aeruginosa may produce an unknown compound unpalatable to rotifers. This study provides insight into dynamics of planktonic communities, and may offer strategies to manage cyanobacterial blooms.

*Funding source: Center for Undergraduate Research and Scholarship

**Histology of the Normal Murine Trachea**

Rachel Latremouille, Christopher Johnson, Leslie Peard, Roni Bollag, and Victor Monterrosos  
Faculty Advisor: Paul Weinberger, Department of Otolaryngology

The first tissue engineered tracheal transplantation was performed in 2008 and has since been proposed as a treatment for patients who suffer from severe tracheal stenosis. While the procedure has been performed experimentally on several patients in Europe, the outcomes are poorly documented and complications including patient deaths have resulted in a call for more pre-clinical investigations. Due to multiple factors, our laboratory chose to adapt a mouse model for bronchiolitis obliterans, to model tissue-engineered tracheal transplantation. Early on, it was realized that there was little literature on normal murine tracheobronchial anatomy. To resolve this problem, we set out to create a histological atlas of the murine trachea. Histologic images of normal murine tracheae (hematoxylin and eosin, and Masson’s trichrome) were obtained using brightfield multispectral imaging at 5x, 10x, and 100x. Images were reviewed and annotated by specialists in airway surgery, veterinary medicine, and anatomic pathology. It is our hope that establishing this atlas will provide important normative data for researchers already using this model, and will cultivate increased interest in the murine model for future tracheal transplantation research. The undergraduate student is first author on the atlas, to be submitted for publication, spring 2015.
The Separation of Children with Disabilities from Classmates within the Classroom: Effects on Social Functioning

Erica Mcket
Faculty Advisor: Jessica Ziemborski, Department of Sociology, Criminal Justice, and Social Work

This study investigates how isolation of children with disabilities may lead to poor social outcomes such as: the inability to effectively advocate for self, few and inadequate friendships, difficulty in being resilient, inaccurate views of abilities, and refusing to attempt a task at hand due to fear of failure. The severity of their disability also plays a major role in their ability to exercise adequate social skills. This research also investigates a correlation between children with disabilities being in typical classrooms and the increase of self-determination that the child may display. Therefore, it may be that where learning takes place matters. Even though the goal of educational inclusion is that all children are educated in the same classroom and are treated equally, children with disabilities may easily be left out in many ways. This study investigates whether children with disabilities are being isolated in a classroom that is classified as an included environment as a result of the difficulty in defining this term. This study uses a mixed method approach to interview and observe school personnel about this practice, and confirms that separation yields detrimental effects on children’s social functioning.

Perfluorooctanoic Acid-Induced Progesterone Synthesis Inhibition is Associated with Decreased Expression of Steroidogenic Acute Regulatory Protein (StAR) mRNA*

Ebony Miller and Sandra Tadros
Faculty Advisor: Jennifer Cannon, Department of Biological Sciences

Perfluorooctanoic acid (PFOA) is an environmentally persistent synthetic fluoropolymer that acts as an endocrine disruptor. Its mechanism of action remains largely unknown, but it has been shown to decrease steroidogenesis. The aims of this study were to determine which steroidogenic enzymes are involved in the PFOA-induced decrease in progesterone (P4) synthesis in Mouse Leydig Tumor (mLTC-1) cells. Cells were treated with PFOA (100nm - 100μM) for 24h before stimulation for 4h with human chorionic gonadotropin (hCG) or forskolin. The expression of steroidogenic acute regulatory protein (StAR), p450 side-chain cleavage (p450scc), and the luteinizing hormone receptor (LHR) were determined by real-time PCR. Our lab previously demonstrated that cells treated with 100μM PFOA for 24h showed an 86% reduction in hCG-induced P4 synthesis compared to untreated cells. To ensure that this decline was not due to diminished LHR expression (mRNA levels were decreased), cells were also stimulated with forskolin. Similar results were obtained. There was no significant difference in levels of p450scc mRNA between PFOA-stimulated and unstimulated treatments. However, the levels of StAR mRNA levels were markedly declined in cells treated with 100μM PFOA. These data show inhibition of steroidogenesis in PFOA-treated mLTC-1 cells is associated with decreased expression of StAR mRNA.

*Funding source: Center for Undergraduate Research and Scholarship, Department of Biological Sciences

Walk or stand? Activity budgets and responses to predators of three fiddler crab species*

Erik Neff and Samantha Anchor
Faculty Advisor: Jessica Reichmuth, Department of Biological Sciences

Predator-prey dynamics have strong influences among many communities. In the salt marshes of Tybee Island and Hunting Island three species of fiddler crabs were captured and observed in a lab setting in order to determine if predator avoidance behavior differed among them: Uca pugnax, Uca pulgator, and Uca minax. At Tybee Island, there is an overlap in where U. pugnax and U. pulgator are found, but in Hunting Island there is a clear separation where there are elevation increases in the marsh. Uca minax is often found interspersed between the other two species. Birds and crab predators (Sesarma spp.) are found throughout the marsh. Marsh mesocosms were constructed with native sediment and artificial seawater. Ten fiddler crabs chosen for observation were randomly selected and marked to represent their population. Activity budget results were calculated and results showed significance among the species for walking and standing in the presence of a predator. However, there was no significance among the species in the behaviors of hiding, climbing, cleaning, burrowing, fighting, bubbling, pushing mud and sand, and feeding. More trials would be necessary to determine if the other behaviors would show significance among the species.

*Funding source: Department of Biological Sciences

The Diet of the Bonnethead Shark, Sphyra tiburo, Around St. Catherine’s Island, Georgia: Composition, Gender Variation, and Temporal Shift Analysis*

Kimberly Price, Jason O’Bryhim, and Stacey Lance
Faculty Advisor: Bruce Saul, Department of Biological Sciences

The trophic structure between declining large predatory sharks, Sphyra tiburo (bonnethead shark), and its primary prey along the coast of St. Catherine’s Island, GA is of consequential concern because of potential impacts to the health of this estuarine ecosystem. Therefore, in order to estimate effects of an increase in S. tiburo populations, it is important to identify its primary prey within this area of its range. We found overall the diet of S. tiburo along the Eastern Georgia coast consists primarily of crabs. Among male and female sharks, males consumed a higher amount of vertebrates than females. Juvenile males consumed a greater amount of shrimp than adult males and adult males consumed a greater amount of vertebrates than juvenile males. Prey types other than crabs occurred more frequently in adult females than juvenile females. A temporal analysis revealed a shift towards an increased consumption of other prey types during summer and fall months. Consumption of crabs from spring to summer months decreased and crab consumption from summer to fall months increased. This analysis could be helpful in determining the ecological and economic effects of increasing populations of S. tiburo on lower trophic level species and this estuarine habitat.

*Funding sources: St. Catherine’s Island Foundation, Center for Undergraduate Research and Scholarship, The Pamplin Student Research and Travel Fund, Department of Biological Sciences
Adenylyl cyclase (AC) is an important enzyme in signal transduction processes and catalyzes the conversion of ATP to cAMP. We found five isoforms of AC in human pancreatic carcinoma HPAC cell line: AC1, AC3, AC6, AC7 & AC9. Both AC1 and AC3 are very important because they are up-regulated in HPAC cells. We also found that forskolin (FSK), inhibits cell proliferation and cell migration but not cell invasion in HPAC cells. Objective: To silence AC1 and AC3 and determine their participation in the inhibitory effect of cAMP on cell migration and proliferation of HPAC cells. Results: To study the functional roles of AC1 and AC3, the expression of both isoforms were knocked-out using siRNA (human). The lack of either AC1 or AC3 proteins was assessed using Western-blotting. When testing for cell proliferation and cell migration, we found that the inhibitory effect of FSK was impaired in the presence of siRNA AC1, but not in the presence of siRNA AC3. Discussion: We conclude that AC1 mediates the inhibitory effect of cAMP in cell proliferation and migration.

*Funding sources: Center for Undergraduate Research and Scholarship, APS, Department of Biological Sciences

Investigation of the Properties of Stem Loop DNA
Delphine Baumert
Faculty Advisor: Angela Spencer, Department of Chemistry and Physics

A stem loop is a strand of DNA containing a double stranded self-complementary region (the stem) and a single stranded region (the loop). This self-complementary region can be denatured using methods that disrupt the base pairs in the double stranded region. We have been studying a number of properties of stem loop DNA including its mobility in native and denaturing polyacrylamide gels. We have shown that we are only able to denature stem loops of certain stem and loop sizes. We have also used various polymerase chain reaction (PCR) parameters in attempt to amplify these stem loops. We have been able to show using polyacrylamide gel electrophoresis that the amplification of stem loops is temperature and primer dependent.

Synthesis of a Difluorinated Derivative of a Bicyclic Aryl Sulfone as a Potential Inhibitor of HHV-6 and HCMV*
Kaitlyn Rouillard
Faculty Advisor: Chad Stephens, Department of Chemistry and Physics

Human herpesvirus 6 (HHV-6) and human cytomegalovirus (HCMV) are two strains of beta-herpesviruses. HHV-6 causes roseola in children and retinitis in AIDS patients, and HCMV is the leading viral cause of birth defects, including deafness. There are no drugs specifically designed for HHV-6, though the antivirals foscarnet and ganciclovir are used to treat HCMV and HHV-6 off-label. However, both drugs exhibit toxicity that limits clinical usefulness. Our group, in collaboration with Dr. Lieve Naesens from Katholieke Universiteit in Leuven, Belgium, has developed a bicyclic sulfone compound that is effective at inhibiting HHV-6 in a cell culture. A previously developed fluorinated bicyclic sulfone compound has shown strong antiviral activity. Because fluorine has such interesting biological effects, a second fluorine atom will be added to this compound to investigate any change in antiviral activity.

*Funding source: Department of Chemistry and Physics
**The effects of perfluorooctanoic acid on cell viability and peroxisome proliferator-activated receptor gene expression in MCF-7 cells**

April Smith

Faculty Advisor: Jennifer Cannon, Department of Biological Sciences

Perfluorooctanoic acid (PFOA) is an endocrine disrupting compound found in food, water, clothes, and other consumer products. It is known to accumulate in the environment and can be taken up through ingestion, inhalation, or skin contact. It has a half-life of nearly four years in humans. PFOA has been shown to bind and activate peroxisome proliferator-activated receptors (PPARs), which are transcription factors found in mammalian cells. PPARs regulate numerous cellular activities, including proliferation and differentiation. Activation of PPARs has been shown to positively regulate PPAR expression. This study aimed to examine the effects of PFOA on cell viability and on PPAR expression in MCF-7 breast cancer cells. Cells were treated for 24h and 48h with 100μM to 100μM PFOA and viability was determined using the CellTiter-Blue Viability Assay. While there was no decline in viability at 24h with any of the PFOA treatments, there was a significant decrease in viability in cells treated with 100μM PFOA for 48h. At both the 24h and 48h time points, cell lysates were collected and RNA isolated using Ambion's RNaqueous®-Micro kit. Primers for PPARα, PPARβ, and PPARγ have been ordered and are being optimized for real-time RT-PCR to determine mRNA levels of those genes.

*Funding sources: Center for Undergraduate Research and Scholarship, Department of Biological Sciences

**Dimensions of PTSD and Its Effects on Military Families**

Johnny Williams

Faculty Advisor: Jessica Ziembroski, Department of Sociology, Criminal Justice, and Social Work

Posttraumatic Stress Disorder (PTSD) has been increasing in recent years throughout the entire military services in the United States. Prior research has shown that this disorder affects not only service-members, but also effects immediate and even more distant family members. From children to entire communities, the trauma that soldiers often experience has been shown to have long lasting effects on relationships (Galovski, 2014). This study furthers this research by looking at specific aspects of PTSD in order to better understand how it can be detrimental to family members. This research analyses how pain and PTSD, sleep disturbance related to PTSD, adjustment issues from PTSD, and transference transmission of PTSD operates on family members. A 17-item PTSD checklist was administered in a military setting in Augusta, GA by on-line surveys, mail surveys and face-to-face interviews. Results confirmed that different aspects of PTSD impacts the life of the veterans and family members in distinct ways.

**Comparison of Four Commercially Available RNA Extraction Products**

Mark Yassa and Latasha Lawson

Faculty Advisor: Jennifer Cannon, Department of Biological Sciences

Many of the studies in our lab involve examination of gene expression in response to different chemicals or culture conditions. One way of determining the level at which a particular gene is expressed is to measure the amount of messenger RNA (mRNA) for that gene. To do this, the RNA must be isolated from the cell, reverse transcribed into the more stable complementary DNA (cDNA), which is then used for quantitative-polymerase chain reaction (PCR). Extraction of RNA from cells can be a challenging and time-consuming process, but there are commercial kits available to help. The goal of this particular study is to compare four of those kits (Ambion's RNaqueous-Micro Kit, MoBio's PowerLyzer Ultra, Sigma's RNAzol RT, and Thermo's GeneJET RNA purification kit) in terms of price, hands-on time in the lab, as well as quantity and quality of RNA extracted. We will be culturing equal numbers of MCF-7 breast cancer cells then harvesting and extracting RNA as indicated by each kit-specific protocol. Following RNA extraction and DNase treatment to remove any contaminating DNA, the RNA will be quantified and the 260/280 ratio determined as an indicator of contamination. Extractions with each kit will be repeated a minimum of three times.

*Funding sources: Center for Undergraduate Research and Scholarship, Department of Chemistry and Physics
**Oral Symposia I**

**Session 1**

*Isn’t it Ionic?: Bicyclic analogues to predict cross-coupling regioselectivity*

JSAC - Butler
2:00 pm - 3:00 pm

**Using Computational Methods to Predict the Regioselectivity in the Nitration Reaction of Fluorene**

Kyle Finnegan
Faculty Advisor: Chad Stephens, Department of Chemistry and Physics

Regioselectivity is the preference for formation of one constitutional isomer over another in a chemical reaction. Regioselective preference is dependent on multiple factors such as directing groups, steric hindrance, and thermodynamics. Understanding how each of these affect regioselectivity is important in determining what the final product of a chemical reaction will be. Thermodynamic parameters can be quantified using computational chemistry programs. Currently, students do not have many opportunities in the organic chemistry curriculum to do thermodynamic calculations using such programs. This research project has focused on developing a computational method for determining/predicting the regioselectivity for the nitration of fluorene, a synthesis reaction that is performed in the Organic II lab. This nitration reaction yields 2-nitrofluorene as the major product instead of the 1-, 3- or 4-isomers. By determining the energies of the various intermediates for each reaction pathway using a computational program, students should gain a better understanding of why the 2-isomer is preferred and more fully comprehend how thermodynamics affects regioselectivity. Students should also gain a larger appreciation of the use of computational methods in organic chemistry.

**Characterizing Redox Couples and Electrochemical Behavior of Lanthanides in Room Temperature Ionic Liquids Using Cyclic Voltammetry**

Michael Stephens
Faculty Advisor: Christopher Klug, Department of Chemistry and Physics

Volatile organic materials which present very high and specific health and flammability hazards are used in many prominent solvent extraction processes in science and industry. Room Temperature Ionic Liquids (RTILs) are unique materials which may present a solution to existing hazards of extraction phases, as in used nuclear fuel partitioning and transmutation schemes. The coordination of lanthanides, such as europium, with DTPA in various RTIL solvents has been characterized by electrochemical and spectroscopic methods. Formal reduction potentials for the Eu 2+/3+ redox couple vs. ferrocene have been calculated when possible, and-plating potentials for europium in these RTILs have also been found. The electrochemical behavior of samarium has been characterized using the same techniques. The viscosity of non-aqueous RTILs has presented a challenge in studying the electrochemical behavior of these compounds and provides a future property to explore using both classic and novel techniques.

*Funding sources: Center for Undergraduate Research and Scholarship, Department of Chemistry and Physics

**Synthesis of Sulfide and Sulfoxide Analogues of Bicyclic Sulfones as Potential HHV-6 Inhibitors**

Tyler Crawford
Faculty Advisor: Chad Stephens, Department of Chemistry and Physics

HHV-6 is a betaherpes virus that affects nearly the entire population by three years of age. This virus is thought to be a mitigating factor in the progression of AIDS, multiple sclerosis, fibro myalgia, cancer, and several other diseases. HHV-6 reactivation in adults can contribute to transplant or graft rejection and has been linked to several central nervous system disorders. Current treatments for HHV-6 include foscarnet and cidofovir. However these drugs are toxic to the kidneys. Previously bicyclic sulfones have been synthesized by our group that show antiviral activity against HHV-6. The structure activity relationship studies have shown that changing certain functional groups changes the antiviral activity. However no research has been done to study the sulfone functional group as a necessary pharmacophore of drug activity. This research involves developing the synthesis of novel sulfide and sulfoxide analogs of our bicyclic sulfones. These compounds are currently being synthesized and characterized by NMR, IR, and GC-MS. Once prepared the compounds will be analyzed to study the change in antiviral activity from the target compound by our collaborator at the Rega Institute for Medical Research in Leuven, Belgium.

*Funding sources: Center for Undergraduate Research and Scholarship, Department of Chemistry and Physics

**Development of a Suzuki Cross-Coupling Reaction for the Organic Chem Lab**

Mark Yassa
Faculty Advisor: Jennifer Cannon, Department of Biological Sciences

The Suzuki reaction is an important reaction in organic synthesis that involves cross-coupling of a boronic acid with an aryl halide using, most commonly, a palladium catalyst. This reaction was discovered by Akira Suzuki and he shared the 2010 Nobel Prize in chemistry. The Suzuki reaction has been used in the synthesis of many important compounds, especially in the field of pharmaceuticals. The purpose of this research is to develop a Suzuki reaction to be used in the Organic II lab here at GRU to allow students to gain experience with this reaction. Using 2-iodofluorene and 4-cyanobenzene boronic acid as the two reactants, we have tested different bases, solvents and catalysts in order to develop a high yielding Suzuki reaction. Thus far, we are able to obtain yields of the Suzuki coupling product in the 60-70% range with a reaction time of just 30 min, followed by recrystallization of the product. The 2-iodofluorene starting material is prepared by iodination of fluorene by our newly developed method, while the boronic acid is purchased.

*Funding sources: Center for Undergraduate Research and Scholarship, Department of Chemistry and Physics
Asma Daoudi (Department of Biological Sciences) and Nicole Howie (Department of Oral Biology)

Faculty Advisor: Mohammed Elsalanty, Department of Oral Biology

Long-term intravenous bisphosphonate therapy has been associated with osteonecrosis of the jaw following dental procedures, a devastating and essentially untreatable condition that is characterized by the presence of exposed, non-vital bone in the mouth that persists for over 8 weeks. In this study, we hypothesized that long term bisphosphonate therapy coupled with dental extraction would result in impaired osteclast activity. To test this hypothesis, 60 retired-breeder, female Sprague-Dawley rats were randomly assigned to control and treatment groups (n=30 each). The control animals were injected with 0.3mL of phosphate-buffered saline (PBS) while the treatments were injected with 0.3mL 80μg/kg of intravenous zoledronic acid (ZA). Injections were administered weekly for 13 weeks and followed by 2 molar extractions. Mandles were harvested 1 and 8 weeks post extractions for Tartrate-Resistant Acid Phosphatase (TRAP) analysis. A significant decline was detected in osteoclast number (p=0.01) and surface ratio (p=0.35) in the treated group compared to controls. The results of this study suggest the validity of this animal model for future studies investigating possible mechanisms of BRONJ.

*Funding sources: Georgia Regents University Extramural Success Award, NIH

**Development of recombinant plasmids HA-AC1 and HA-AC3**

Humma Hassan

Faculty Advisor: Maria Sabbatini, Department of Biological Sciences

Transmembrane adenyl cyclases are enzymes that convert ATP into secondary messenger cAMP (Cyclic AMP). We studied the effect of Adenyl Cyclase (AC) isoforms on differentiation of pancreatic tissues. We also found that forskolin, which stimulates AC, inhibits cell proliferation HPAC cells and that only AC1 mediates the inhibitory effect of forskolin on cell proliferation.

**OBJECTIVE:** Construction of recombinant HA-AC1 and HA-AC3 plasmids, used to study interaction between effectors Epac1 and PKA with AC1 protein using HA-immunoprecipitation. HA-AC3 plasmid used to study specificity of these interactions.

**METHOD:** Recombinant plasmids were constructed through insertion of AC1 or AC3 into 5’EcoRI and 3’NotI sites of pCMV-HA-N vector. E.Coli were transformed with recombinant plasmids and grown. Minipreps of bacteria were carried for isolation of plasmids. Transfection was performed to carry plasmid into HPAC cell line while Western blotting was used to confirm success of the transfection and expression of the recombinant proteins.

**RESULT:** The expression of HA-AC1, HA-AC3 and HA-empty plasmids in HPAC cell line was confirmed by Western-blotting of the HA-tag.

**CONCLUSION:** Successful development of recombinant plasmids HA-AC1 and HA-AC3.

**Creating a Drug Sensitive Strain of Pichia pastoris by Deleting Putative Multi-drug Transport Protein Transcription Factors**

Preston Jones, Shawna McCafferty, Stephen Allen, and Robert van Waardenburg

Faculty Advisors: Brian Dunn, Department of Biological Sciences, and Angela Spencer, Department of Chemistry and Physics

Commonly known as baker’s yeast, Saccharomyces cerevisiae is a strain of yeast that has been extensively studied genetically. In S. cerevisiae, the expression of multi-drug transport proteins (MDTPs) is found to be under the control of transcription factors, PDR1 and PDR3. Deletion of these genes in S. cerevisiae leads to decreased expression of multi-drug transport proteins and decreased efficiency in drug export. Mutant strains of this yeast can be used in experiments involving the introduction of drugs into the yeast. Many experiments require a drug-protein interaction, and examining the results of this interaction is the subject of many genetic studies. These studies often involve the purification of the protein of interest after drug manipulation has occurred. Pichia pastoris is a better strain of yeast to use in these experiments because it grows to higher cell densities in fermentation than S. cerevisiae, providing more protein to work with. The goal of this project is to create a drug sensitive strain of P. pastoris by deletion of transcription factors that are homologous to those already discovered in S. cerevisiae. Putative MDTP transcription factors in P.pastoris has been determined via a blast search comparing the P. pastoris genome to S. cerevisiae. The results found 3 genes, 0203, 0233, and 0322 that matched with the PDR1 and PDR3 genes in S.cerevisiae. We hypothesize that knocking out one or more of these genes will cause decreased expression of MDTPs in our mutant strain. Using homologous recombination and two selectable markers (ability to synthesize histidine and resistance to the toxin G418), we have successfully knocked out all 3 of these genes individually and have created two double knockout strains (0233-0322 and 0203-0233). Drug sensitivity assays in which we grew the mutant strains on plates with doxorubicin or camptothecin showed no enhancement in drug sensitivity (all strains were still able to grow when incubated with the toxin). Because we cannot measure the expression of MDTPs directly, we use this assay to indirectly relate the growth of the yeast to expression of MDTPs. The continued growth of our mutant yeast strains leads us to believe that all three genes must be deleted in a single strain to cause reduced MDTP expression.

**Aquatic Therapy Strength Training Benefits for the Leg Strength of Children with Cerebral Palsy**

Elizabeth Quick

Faculty Advisor: Raymond Chong, Department of Kinesiology and Health Sciences

Cerebral palsy is a motor disability that is evident early in life that is caused by a brain abnormality that is present often by one year of age and unchanged after that time (Geralis 24-25). There is no direct treatment for cerebral palsy to date; however, there are resources to cope with the motor problems associated with the disorder. Aquatic therapy for children with cerebral palsy is gaining popularity among pediatric physical therapists. In order to determine the effectiveness of aquatic therapy involving leg strength training, a group of children with cerebral palsy were given specific leg strengthening exercises in an aquatic environment. Another group of children with cerebral palsy were given leg strengthening exercise in a pediatric clinic. This experiment took place over the course of ten weeks. A leg strength test was given to both sets of participants prior to and after the exercises were administered. The results were then analyzed to determine whether or not the aquatic leg strengthening exercises were beneficial or had no effect on the leg strength of the participants.
Understanding the Human Body through Molecular Evolution and its Use in Health Care

Sean Mongan
Faculty Advisor: Soma Mukhopadhyay, Department of Biological Sciences

Our understanding of the underlying molecular basis of human evolution provides us the opportunity to closely examine the relationship between DNA sequence element and human health. Emerging evidence implicates specific DNA sequence element within our genome to survival advantage or to disease susceptibility. Human genome and its closely related species Homo neanderthalensis and Denisovans are recently sequenced, documenting that modern humans share more DNA similarities with these ancient humans than others. Europeans tend to share more DNA with the Neanderthals, and Polynesian and Eastern Asian populations tend to share more DNA with Denisovans. As technology advances, the way we execute health care changed drastically. Along with this, understanding of how the gene sharing affects our bodies will allow us to better aid the patients and personalize health care.

How Perceived Autonomy Affects Teachers’ Work

Alicia Scalia
Faculty Advisor: Dustin Avent-Holt, Department of Sociology, Criminal Justice, and Social Work

Education today is made up of standardized tests and controlled curriculum, which is not always beneficial for the student or teachers. Before the advent of standardization, teachers had autonomy inside their classroom to make choices on how and what to teach. The impact standardization has had on students has been researched, but the impact on teachers has not been as thoroughly researched. The impact restricted autonomy has on teachers is important because it impacts the quality of teachers attracted to the profession, the ability of the teachers to teach, and also the children in the education system. Lack of autonomy greatly affects teachers work, and consequently it affects how children are taught and learn. In order to discover how teachers perceive their autonomy and the affects it has on their work I have interviewed several teachers who work in different subjects and grades. I have also done historical data analysis to track the change in policies and see how it compares to the teachers experiences. It has been found that teachers’ perceived lack of autonomy has negatively impacted their ability to teach students who learn differently and has also changed their view of teaching as work.

Session 3

“Southeastern Superheroes: What perceptions of gender and existentialism teach us”

JSAC - Hardy
2:00 pm - 2:45 pm

Perceptions of Gender Versus Sex in Southeastern College Students

Kateland Dowds
Faculty Advisor: Melissa Powell-Williams, Department of Sociology, Criminal Justice, and Social Work

This study explored the differences between gender and sex and examined how different people view “gender” and “sex.” Through the use of qualitative interviews, this study focused on the variable opinions of the differences between gender and sex by college students living in a Southeastern region. The main concept of this research question was to determine if people view biological sex and gender differently and how these views have an effect on the roles people play in daily life. Another focus was how typical and atypical gender characteristics affect one’s daily life. Research was based on the interviews conducted with four Southeastern GRU college students, stratified both by sex and thinking views. Findings observed during this research were that liberal thinkers tend to recognize a distinction between gender type and sex while conservatives believe they are close to synonymous. It was concluded that perceptions of gender affect conservative thinkers more because it emphasizes their need to conform and fit in with society to classify one’s importance, while liberal thinkers rebel and express their individuality.

Waiting for Heroes: An Examination of Psychological Disorders, Existentialism, and General Strain Theory in Superhero Films

Austin Hendricks
Faculty Advisor: Scott Wilkes, Department of Psychological Sciences

Past research into the expression of psychological disorders in superheroes has largely been done by those with little training in the field of psychology and so is based on “pop psychology.” Specific characters that have been the focus of such “research” include Batman and Iron Man. This thesis will expand upon the existing body of information regarding the expression of psychological disorders in the Christopher Nolan Batman trilogy and Marvel’s Iron Man films through the use of a multidisciplinary approach, focusing on psychology, sociology, and philosophy. Specifically, it will examine the expression of Schizoid Personality Disorder and Narcissistic Personality Disorder in Batman and Iron Man, respectively. Examples of how the characters fit the criteria outlined in the DSM-V will be gleaned from the films and used to demonstrate how the disorders can be applied to the characters. It will then relate those psychological disorders to various psychological, sociological, and philosophical theories, including projection, Agnew’s General Strain Theory, Existentialism, and Relativist Theory. It will conclude with a discussion of the past treatment of those with mental disorders and how the popularity of these superhero films indicates a shift in societal thinking and treatment to a place where acceptance is possible.
**Session 4**

*“Dragón and Herzog Debate the Merits of Music and ROPE Burns in Nazca”*

JSAC - Coffeehouse  
2:00 pm - 3:15 pm  

**Burial Traditions in Nazca Peru and the Corresponding Hierarchy Structures**

Sara Asmann  
Faculty Advisor: Rhonda Armstrong, Department of English and Foreign Languages  

An examination of the burial traditions of the ancient Nascas leads to a better understanding of the evolution of the culture. In particular, an examination of grave goods and the amount of trophy heads from each region shows changes in the political atmosphere and hierarchy structures.

**From Script to Production: Osvaldo Dragón’s Historia de un flemón**

Yelitza Maura and Maria Maura  
Faculty Advisor: Jana Sandarg, Department of English and Foreign Languages  

The playwright, Osvaldo Dragón, was one of the most important figures in the revitalization of Argentine theater in the 1950s. His most successful work was a trilogy of one-act plays, Historias para ser contadas, published in 1957 and produced by university troupes and experimental theater groups throughout the Spanish-speaking world. These fifteen-minute plays focused on the interaction between actors and audience, with minimal setting and rapid role-switching. The blending of tragedy, irony and humor, with the incorporation of Argentine popular culture and slang, produced a unique dramatic form based on the theater of the absurd. This presentation will chronicle the process of moving from manuscript to production of Dragón’s Historia de un flemón. The presenters will discuss the theater of the absurd, its portrayal of social problems in the play, and the applications to contemporary society, as well as their roles as audience, actors, directors and producers. The experience allowed them to explore creative ways to express themselves in Spanish, to understand the differences between viewing and producing a play, to counter the challenges of native and non-native actors, and to discover parallels of the absurd in twenty-first century life.

**Authenticity and Performativity in Herzog**

Walter Quiller  
Faculty Advisor: Todd Hoffman, Department of English and Foreign Languages  

Saul Bellow’s Herzog provides a platform through which the concept of subjectivity can be discussed. For some theorists, the subject is something that can be grounded. Martin Heidegger for instance employs ontology in order to present a stable, authentic subjectivity. In contrast, Judith Butler argues that this subject does not exist. Rather it is an illusion carried out through performances. Research on Heidegger’s idea of authenticity and Butler’s notion of performativity provides insight into Bellows’ treatment of subjectivity. The characters in Herzog both reject and fail to uphold Heideggerian standards of authenticity. However they do participate in performativity. The identities that they attempt to convey are actually performances that create illusions of a grounded subject. Through analyses of Bellow’s central characters, it is evident that he rejects the Heideggerian view and that the Butlerian model of subjectivity (or anti-subjectivity) is a more appropriate means of exploring subjectivity in the novel.

**The Physical Effects of Music and Its Healing Properties**

Steven Cauthron (Health Sciences), Tabitha Odom, Ashley Santiago, and Breana Walton (Health Sciences)  
Faculty Advisors: Debra VanTuyll, Department of Communications and Professional Writing, and Carl Purdy, Department of Music  

Researchers have done studies to show how music affects the physical brain and how it is used to heal the human psyche. They have found that not only does music have a physical effect on the brain, but it can be used to heal people. Doctors have used this knowledge to help people with various medical or psychological conditions. Music as a medical tool has received study in recent years. Scientists, doctors, and musicians have collaborated to discover if music has a physical and psychological effect on the brain. Further research has been done to determine how certain aspects of music like pitch, organization, and rhythms affect certain areas of the auditory brain. Scientists have used fMRIs to see how music affects the physical brain. Based on this data, doctors have begun to use music in therapy in order to treat brain trauma or impairments like stroke and frontal lobe damage. Psychologists have used music in therapy to help treat mental illnesses like autism, anxiety, and depression. In psychology there are many ways to use music in therapy to treat various ailments. Based on data collected, researchers have determined that music can repair brain injuries and improve some psychological illnesses.

**Methods in Communication: The ROPE Process in Public Relations**

Erica Ruggles, Kaitlin Keller, and Savannah Maddox  
Faculty Advisor: Rick Davis, Department of Communications and Professional Writing  

As budding public relations practitioners, we have begun to utilize and perfect the ROPE method for use in present and future public relations campaigns. ROPE stands for Research, Objectives, Programming, and Evaluation. This tool allows practitioners to identify the target audience of the intended message, beginning at the research stage, to allow for optimal message resonance. Once objectives have been established, programming/execution can begin, followed by the evaluation stage, during which practitioners consider the success of their campaigns. As we describe each stage of the ROPE process, its clear benefit to many other life situations, beyond campaigns, will become apparent.
**Oral Symposia II**

**Session 5**

**“MUD CRABS AND BIRDS ENJOYING A BEER AT THE CORNER OF STEM LOOP AND FISSION DRIVE”**

JSAC - Butler

3:30 pm - 4:45 pm

**Novel Application of Stem-Loop DNA in SELEX**

Genevieve Coe

Faculty Advisor: Angela Spencer, Department of Chemistry and Physics

Stem-loop DNA is made of nucleotides that fold into a specific secondary structure. The 5’ and 3’ ends form a “stem” of double-stranded DNA through complementary base pairing. The single-stranded segment of nucleotides in the middle forms a “loop” region. We designed a DNA stem-loop that has 25 base pairs in the stem and 50 random nucleotides in the loop. We studied the behavior of this stem-loop, designated 7-25-50R, using PCR and polyacrylamide gel electrophoresis (PAGE). PCR amplification of 7-25-50R showed two products, which were determined by PAGE and subsequent analysis to be double-stranded DNA and stem-loop DNA. The significant amount of stem-loop DNA produced from PCR amplification makes 7-25-50R a viable candidate as the starting material for SELEX, a process that generates aptamers. SELEX requires single-stranded DNA or RNA to bind a specific target. Strands that bind are then isolated and amplified for additional rounds of selection. Traditional amplification of single-stranded DNA results in double-stranded DNA, which must be regenerated before it can bind again to the target. By using our designed stem-loop DNA as a starting material in SELEX, we are hoping to bypass the regeneration step and make aptamer generation more efficient.

*Funding sources: Department of Chemistry and Physics, Center for Undergraduate Research and Scholarship, The Pamplin Student Research Fund

**Investigation of Stem Loop DNA Stability Using Native and Denaturing Polyacrylamide Gel Electrophoresis**

Holly DuPlain

Faculty Advisor: Angela Spencer, Department of Chemistry and Physics

Stem loop DNAs are single stranded oligonucleotides composed of two complementary stem regions and a single stranded loop region. Several stem loop constructs consisting of either ten or twenty nucleotides in the stem region and variable numbers of nucleotides in the loop region were studied to determine mobility through native and denaturing polyacrylamide gels. Due to its compact structure, stem loop DNA runs farther through a native polyacrylamide gel than a single stranded oligonucleotide of the same length. Early observations of the behavior of the stem loop DNAs on denaturing gels indicate that stem loop DNAs with larger stem:loop ratios resist denaturation on traditional denaturing polyacrylamide gels. Thus we are currently investigating using increasing concentrations of urea and formamide as denaturants in gel electrophoresis to determine the optimal conditions for denaturing stem loop DNAs on polyacrylamide gels.

*Funding sources: Center for Undergraduate Research and Scholarship, The Pamplin Student Research Fund

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**In Vitro Toxicity Study on the Role of a Novel Epiphytic Cyanobacterium in Avian Vacuolar Myelinopathy**

Joely Maldonado and Evadne Beshiri

Faculty Advisor: Faith Wiley, Department of Biological Sciences

Avian vacuolar myelinopathy (AVM) is a neurological disease associated with the consumption of aquatic vegetation such as hydrilla and the novel cyanobacterial species that thrives on this vegetation. Research indicates that the etiologic agent of AVM displays characteristics of a toxin and it has been hypothesized that the epiphytic cyanobacterium is a source of that toxin. A mammalian glial cell line is currently used as an in vitro model to track toxicity in extracts of the hydrilla and associated cyanobacteria. The objective of this study is to assess the specific role of the cyanobacteria in AVM by comparing cytotoxicity of the hydrilla/cyanobacterial extract with a newly available extract of the isolated cyanobacteria. Current results display a significant decline in cell viability after exposure to high concentrations of the cyanobacterial extract following 24h and 48h exposures. Future research includes comparing these viability results to the effects of hydrilla/cyanobacterial extract at each time point, as well as examining other endpoints. This research will give valuable preliminary data for a complete study of the cyanobacterium associated with AVM.

*Funding source: Department of Biological Sciences

**A Comparison of Mud Fiddler Crab Response to Varying Levels of Glyphosate**

Alyssa Outhwaite and Katllyn Gill

Faculty Advisor: Jessica Reichmuth, Department of Biological Sciences

As land use changes and urbanization increase in coastal zones, more pollutants are entering into estuaries and salt marshes. Here, organisms are often exposed to damaging concentrations of pollutants that are detrimental to basic functions such as behavior. Mud fiddler crabs (Uca pugnax), a common inhabitant of southeastern salt marshes, are important in these ecosystems. The purpose of this experiment was to determine the effects of varying concentrations of glyphosate, a common weed killer ingredient, on growth, burrowing behavior, and general activity. Crabs were collected from two locations: Tybee Island, GA and Hunting Island, SC. Four mesocosms with 10 crabs each and concentrations of glyphosate at 0%, 1%, 3%, and 6% were maintained for two weeks; each mesocosm was repeated 3 times for a total of 3 trials each. No significant difference was found for the number of deaths between sites or among treatments, but Tybee Island crabs made significantly more burrows than Hunting Island crabs. Tybee Island receives many visitors, and is downstream of Port Royal and Port of Savannah, and data collected by the EPA suggests it is highly polluted. The Tybee Island behavior may be associated with this exposure, but more research is needed.

*Funding source: Department of Biological Sciences
Investigating the role of Hob1 in repairing double stranded DNA breaks in the fission yeast, *Schizosaccharomyces pombe*  
Sarah Ozturk, Andy Mai, and Daitoku Sakamuro  
Faculty Advisor: Amy Abdulovic-Cui, Department of Biological Sciences

Mutations in DNA induce many diseases, including cancer. The human protein, Bin1, has anticancer properties and interacts with proteins involved in maintaining DNA stability. Work completed at the GRU Cancer Center has shown that Bin1 is specifically involved in the nonhomologous end-joining pathway (NHEJ), a pathway that repairs DNA breaks. To complement this work, we are investigating the role of Hob1, the homolog of Bin1 in fission yeast, in NHEJ. If Hob1 functions in a similar manner to Bin1, then removal of Hob1 from yeast should decrease the cells ability to repair breaks in the DNA. We are testing this hypothesis using a genetic yeast transformation protocol that measures how efficient the yeast are at converting a linear piece of DNA into a repaired circular piece of DNA. Our initial data showed that yeast lacking the HOB1 gene are 10 fold more effective at repairing the linear DNA compared to wildtype yeast. These data were surprising as they contradict our hypothesis and the data collected in human cells that lack Bin1. We are currently repeating the experiment to verify our results. Together our research supports a negative role for Hob1 in repairing DNA double strand breaks in the fission yeast.

*Funding sources: Department of Biological Sciences, Center for Undergraduate Research and Scholarship

**Session 6**

**Putting a Spin on Surface Tension in the Toroidal Moment is Pretty Metal**  
JSAC - Hardy  
3:30 pm - 4:30 pm

Measuring Surface Tension Using the Pendant Drop Method*  
Jaleel Bolden, Zane Corder, Charlene Higdon, Camille Miller  
Faculty Advisor: Josefa Guerrero Millan, Department of Chemistry and Physics

Measuring surface tension between fluids is of great practical importance in the oil, food, chemical, cosmetic, etc. industries. Instruments that employ the Du Nouy ring and Wilhelmy plate methods are in common use in industry and research laboratories but they are very labor intensive. There is a need for a rapid, easy and low cost technique with satisfactory accuracy and reproducibility. Reliable measurement of these parameters require significant computer programming and image analysis. The goal of the project has been the development of a computer program written in Matlab which use the pendant drop method to measure the surface tension between two fluids. In addition, an experimental setup has been developed to test the accuracy of this method. In the framework of the soft matter, where the surface tension of the fluids plays a key role, the use of more complex and biological fluids makes data about how these fluids interact harder to find. This is the reason that codes like these are indispensable tools in these laboratories.

*Funding source: Department of Chemistry and Physics

**Measurement of the Interactions of Low Energy Gamma Rays with Dense Metals vs. Pb for Applications in Gamma Camera Collimators**  
Jessica Robinson and Thomas Lynam  
Faculty Advisor: Gregory Passmore, Department of Medical Laboratory, Imaging, and Radiological Sciences

Nuclear imaging is widely used in the detection of coronary artery disease. Radioisotopes Tl-201 (70-80 keV) and Tc-99m (140 keV) are injected into the bloodstream of the patient separately to gain pictures showing tissue viability and heart perfusion. There is difficulty in applying these radioisotopes simultaneously to image the heart because the lower Tl-201 energy photons in the presence of the Tc-99m higher energy photons when using a Pb collimator creates K-shell interactions between the Pb and Tc-99m photons, called downscatter. These interactions appear in the Tl signal region, reporting false data. Replacing the Pb in the gamma camera collimator with another suitable dense metal that has different scatter characteristics from Pb could allow a simultaneous dual-isotope method, which would increase the detectability of reversible myocardium defects and provide better patient care.

**Toroidal Moment Contributions to the Multiferroic Acoustic Susceptibility**  
Alexander Price  
Faculty Advisor: Trinanjan Datta, Department of Chemistry and Physics

We consider the effects of toroidal moment corrections to the acoustic susceptibility tensor of a material that is simultaneously ferroelectric and a canted antiferromagnet (multiferroic). Using the Landau-Lifshitz equation of motion for the magnetization, the Landau-Khalatnikov relaxation equation for the electric polarization, and an equation of motion for the toroidal moment we analytically compute the corrections to the acoustic susceptibility tensor. In the presence of toroidal moment coupling find that the previously vanishing susceptibility components in the multiferroic channel are now non-zero. Additionally, the toroidal corrections give rise to nonzero, asymmetric susceptibility components in the magnetic, electric, and multiferroic channels with both real and imaginary corrections to the susceptibility.
TRANVERSE DISTORTION EFFECTS ON THE KASTELEYN AND KDP TRANSITION IN SPIN ICE*

CurtisLee Thornton
Faculty Advisor: Trinanjan Datta, Department of Chemistry and Physics

Geometrically frustrated pyrochlore oxides containing a rare-earth ion and a transition metal ion form a network of corner-sharing tetrahedra. Prominent examples include Dy2Ti2O7 and Ho2Ti2O7. Magnetic frustration in these compounds suppresses the formation of a long-range ordered ground state resulting in an exotic phase of matter called spin ice. Elucidating the role of external perturbations such as pressure and magnetic field is an important step towards understanding the novel KDP and Kasteleyn phase transitions arising in these classical spin ice materials. Utilizing an analytical approach based on the Husimi tree approximation, we investigate the effects of both transverse and uniaxial pressure distortion of the spin ice tetrahedra on both the KDP and Kasteleyn transition in the presence of an external magnetic field. Compared to the uniaxial distortion scenario, we find that including the effects of transverse distortion leads to further suppression of magnetization and heat capacity in both the Kasteleyn and KDP cases.

*Funding sources: NSF Savannah River Scholars Program, Georgia Regents University Small Grants Program

SESSION 7

“BUZZING AROUND THE MEDIEVAL FAIRE DRESSED AS A SPY ISN’T VERY CULTURED”

JSAC Coffeehouse
3:30 pm - 4:30 pm

THE SPY NEXT DOOR: WOMEN OF THE SPECIAL OPERATIONS EXECUTIVE 1941-1946

Sonja Andrews
Faculty Advisor: Ruth McClelland-Nugent, Department of History, Anthropology and Philosophy

This study will analyze the role women played as spies for the British government. Specifically an analysis of the significance women spies had in a patriarchal society where women were kept in traditional roles. The research will be done by evaluating various scholarly documents that explore three women spies that served in the secret service for Brittan. The research will also include pictures of three women spies to show how their chameleon appearance helped them integrate into enemy territory. This study is important because these women’s contributions have almost gone unrecognized. Their contribution to the war effort in World War II Brittan, were a significant contribution to the victory over Germany.

Etiology of Prescription Opiate Addiction in U.S. Culture

Sean McLarnon and Khadijah Alexander
Faculty Advisor: Angela Bratton, Department of History, Anthropology, and Philosophy

This research looks to highlight aspects of U.S. culture in the etiology of addiction. Specifically, how the learned human behavior patterns in regards to prescription opiates are constructed by government and medical institutions, and how said institutions influence public perceptions of certain substances. To see how these patterns and perceptions manifest themselves, a series of questions were formed to target U.S. opinions about doctor-patient relationships, possible experience with substance abuse, and perceived harmfulness of substances. These questions were distributed randomly through an online survey, and also discussed in focus groups of various demographics; one focus group contained participants recruited outside of a substance abuse support group. The data gathered illuminated the power medical institutions have in determining what is considered “normal health” and “safe substances,” and decreasing the perceived harmfulness of prescription opiates despite the potential for abuse. In contrast to the survey participants, the focus group containing participants who identified as addicts were less inclined to define their wellness in accordance with medical knowledge, and displayed distrust in the medical institutions holding the authoritative knowledge for substance abuse. Understanding this cultural discourse may be crucial in combating the addiction epidemic, and implementing treatment programs on the individual level.

GETTING BUZZED: THE EFFECTS OF ENERGY PRODUCING ELEMENTS ON SOCIETY

Jaleesa Mitchell
Faculty Advisor: Angela Bratton, Department of History, Anthropology, and Philosophy

In today’s society we are so tuned into the world around us that we spend countless hours on the go. Because of this, the consumption of caffeine has risen over the past twenty years. Caffeine is a substance that can make you feel more awake, can be used as a diuretic, and, in some cases, as a stimulant. The idea as to whether or not caffeine is healthy differs from person to person. This presentation will explore the possibility that while caffeine can be good for a person, it is still a deterrent from living a healthy lifestyle. The data for this project was collected through random sampling over the period of one month. This method allowed me to have a minimum of twenty-five participants who filled out an electronic questionnaire that reviewed their school, sleep, and work schedules alongside their caffeine consumption. This topic and data is important to research because caffeine-ated products have a large consumer base and are sold in every part of the United States. Many of these consumers do not understand how caffeine affects their body and their health, thus making it imperative that they be informed and be presented with all of the facts.
The People behind the Bars: Medieval Prisons and the Corruption that Ravaged them
Ashley Pacheco
Faculty Advisor: Wendy Turner, Department of History, Anthropology, and Philosophy

The basis of this paper observes the economic disparity within the medieval prison system and how it affected a prisoner’s experience because the two are directly related. Essentially, the wealthier an inmate was, the better the food, conditions, and personal freedom was. Poor inmates were treated negatively and their interests were not looked after in these institutions and many had to deal with starvation, dirty living quarters, begging, and isolation. As well, it analyzes the corruption of the prison system due to this financial imbalance between inmates. Guards were easily bribed as well as the high ranking prison officials and prison life could become a living hell due to their actions towards inmates. Special attention went to the wealthier inmates whereas the poorer inmates were left in the dark both literally and figuratively which created an unlivable environment where prisoners suffered mentally and in extreme cases, resorted to suicide. In short, medieval prisons were institutions driven by money and ran by corruption and the treatment of the prisoner by the prison guards was directly correlated to their economic standing.
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The Phi Kappa Phi Student Research and Fine Arts Conference is an opportunity for all students at Georgia Regents University, regardless of discipline, to showcase their scholarly and artistic endeavors. Participating students were competitively selected from abstracts of their proposed conference projects. The proposed project may have been presented elsewhere or be expected to be presented elsewhere, and it must be endorsed by a full-time Georgia Regents faculty member. The conference is open to all undergraduate students. Students and faculty sponsors are not required to be members of Phi Kappa Phi. All presentations are judged by faculty judges, with awards given to the top presentations in each session.

As in previous years, the design of the poster and resulting program cover seeks to merge art and science into one pleasing and representative image. The models used throughout chemistry seemed fitting to use to hold bright and eye-catching patterns. The design stands out perfectly on a background of olive green, a color that signifies learning, growth, and harmony.

- The Publications and Design Team