



# 8th Annual Phi Kappa Phi Student Research and Fine Arts Conference

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**T**he Student Research and Fine Arts Conference is an opportunity for all students at Augusta State University, regardless of discipline, to showcase their scholarly and artistic endeavors. In a double-blind review process, participating students were competitively selected from previously submitted 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 Augusta State University faculty member. The competition was open to all undergraduate and graduate students. Students and faculty sponsors were not required to be members of Phi Kappa Phi.

The abstracts, from 300 to 500 words in length, had to contain sufficient detail to permit reviewers to understand and evaluate the overall quality of the project.



## Abstract Reviewers

Dr. Paul Harris, Political Science  
Dr. Karen Aubrey, Professional Writing  
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Professor Sue Buzhardt, Nursing  
Dr. Sabina Widner, Psychology  
Dr. Deborah Richardson, Psychology  
Dr. Cameron Lippard, Sociology  
Dr. Steve Hobbs, Psychology  
Dr. Chad Stephens, Chemistry

Dr. Ray Whiting, Political Science

Phi Kappa Phi would like to thank the following for their support:

Katherine Reese Pamplin  
College of Arts and Sciences,  
Dr. Robert Parham, dean

College of Education,  
Dr. Thomas E. Deering, dean

College of Business Administration,  
Dr. Mark Miller, dean

Amanda Phillips and Thomas Moss,  
students in Dr. van Tuyl's COMP 3502 class  
for their help with the poster and the program

## 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 282 chapters located on university campuses throughout the United States, Puerto Rico, and the Philippines, Phi Kappa Phi is among the oldest and most respected academic honor societies.

Students elected to membership in Phi Kappa Phi include the upper 7.5 percent of last-term juniors and the upper 10 percent of seniors, along with outstanding graduate students, faculty, and alumni.



## Program

### Keynote Speaker

“Therapeutic DNA Minor-Groove Binders:  
From the Bench to the Clinic,”  
by Prof. David W. Boykin, Department of Chemistry,  
Georgia State University  
11 a.m. - 12:15 p.m. • University Hall, Room 170

### Opening Remarks and Performance

12:30 p.m. - 12:50 p.m.  
Science Building Atrium

Featuring

***Diana Thompson, soprano, Augusta State University***

### Poster Presentations

1 p.m. - 2:15 p.m. Science Building Atrium

### Panel Session I

1-2:15 p.m.

#### *Religion and Politics*

Dr. Sandy Reinke, chair  
Science Building Room W-1001

#### *Chemical Transformations*

Dr. Sam Robinson, chair  
Science Building Room W-1004

#### *Constructions*

Dr. Mary Jane Anderson, chair  
Science Building Room W-1008

### Panel Session II

2:30 - 3:45 p.m.

#### *Cognitions*

Dr. Sabina Widner, chair  
Science Building Room W-1001

#### *By the Numbers*

Dr. Cornelius Stallman, chair  
Science Building Room W-1004

#### *By Land and Sea*

Dr. Donna Wear, chair  
Science Building Room W-1008





# Abstracts



Session 1, Panel 1:

# Religion and Politics

## ***The Political Fall of Ralph Reed***

**Student:** Matt Crunk, Political Science

**Faculty Sponsor:** Dr. Sandra Reinke, Political Science

This paper traces the history of Ralph Reed's involvement with politics, beginning with his career as a student at the University of Georgia, through his leadership of the Christian Coalition, and on to his defeat in his 2006 bid to become Georgia's lieutenant governor. Reed's controversial career as the builder of the Christian Coalition and the architect of its political success tells us much about the influence, strategies and tactics used by the Christian right in their efforts to remake American politics.

## ***Church in School: Renting Space for God in Public Schools?***

**Student:** Quamid Green, Political Science

**Faculty Sponsor:** Dr. Sandra J. Reinke, Political Science

In the cramped space that is New York City, finding space to start a new church is a challenge. The traditional solution was simple: the would-be church rented space in New York City's public schools. This case study traces the history of a number of legal challenges to this practice and speculates on the future of separation of church and state.

## ***The IRS Versus All Saints Church***

**Student:** Daniel Upshaw, Political Science

**Faculty Sponsor:** Dr. Sandra J. Reinke, Political Science

The IRS is challenging the non-profit status of All Saints Episcopal Church in Pasadena, California. In order to maintain that status, which is critical to all religious congregations, religious leaders are prohibited from directly or indirectly participating in or intervening in a political campaign on behalf of or in opposition to any candidate for political office. In a sermon preached on Sunday, October 31, 2004, the Reverend George Regas asked members of the congregation to vote "all your values. Bring a sensitive conscience to that ballot box." Reverend Regas told his parishioners that he could not tell them how to vote, but he did use Christian teaching to criticize the Bush administration's policies on many social issues, and the war in Iraq. All Saints has been supported by religious leaders of all faiths, who understand clearly that their own freedom to speak truth to power is in peril when the

government feels free to use the IRS or any government agency to intimidate religious groups into silence.

## ***Secularism, Islam, and Turkey at the Crossroads***

**Student:** James E. Keen, Political Science

**Faculty Sponsor:** Dr. Sandra J. Reinke, Political Science

Turkey falls on the edge of two worlds which are pulling the nation apart. In one sense a modern, secular, western Turkey would be able to fit itself into the European mold and become one with the European Union. But on the other hand, Turkey is also a Muslim nation, with strong ties to the Middle East. This paper considers the connections between the current Islamist government, Turkey's prospects for joining the European Union, and the Pope's recent visit.

## ***Freedom of Religion in the People's Republic of China***

**Student:** Victoria Kulovitz, Political Science

**Faculty Sponsor:** Dr. Sandra Reinke, Political Science

Article 36 of the Constitution of the People's Republic of China states that "citizens of the People's Republic of China enjoy freedom of religious belief," and that "no state organ, public organization or individual may compel citizens to believe in, or not believe in, any religion." However, the practices of China's government are in drastic conflict with their Constitution. The case of Falun Dafa offers a tragic example of how one religious minority's members are systematically imprisoned, tortured, and mistreated in the name of "social harmony."

## ***In the Name of God:***

### ***Poland and the "Abortion Boat"***

**Student:** K. Brien Word, Political Science

**Faculty Sponsor:** Dr. Sandra Reinke, Political Science

Catholicism is deeply entrenched in the Polish national identity, leading to some of the strictest abortion laws in Europe. Hence, the arrival in Polish ports of the S. S. Langenort, aka "the abortion boat"



created a firestorm of controversy in 2003. The story of the “abortion boat” and its impact on Polish politics allows political scientists to get a clear view of the religion-politics connection, and its potential impact on public health issues and women’s rights.

### *Art as a Voice Against the Status Quo*

**Student:** Gerald Wayne Hitchcock II, Communications

**Faculty Sponsor:** Dr. James Garvey, Communications

**A**rt has a long history as the voice of people on the periphery of society. The wars, political corruption and philosophical ideas that came to the social

forefront during the 20th century led many artists to call to question, and sometimes rail against, the institutions that had long held sway over public thought and discourse. In keeping with this tradition of art as guerrilla warfare. The Hand Project (0:10)-A multi-media presentation that objectively questions the rise of evangelical fundamentalism in America. The presentation leaves it to the viewer to decide whether this group positively or negatively impacts our society. A bronze-sculpted hand that has an originally edited scenario from the film Jesus Camp that simultaneously plays on the sculpture and behind it. Requires a projector and its own viewing space.

Session 1, Panel 2:

# Chemical Transformations

### *A Purification Method of Bacterial Pigment Prodigiosin from Serratia*

**Student:** Franchessa D. Maddox, Chemistry & Physics

**Faculty Sponsor:** Dr. Jason M. Andrus, Biology

**A** red pigmented bacterium was isolated from a water sample collected at Rae’s Creek. DNA sequencing revealed this bacterium (Serratia FM001) to be a member of the genus Serratia. Serratia are known to produce a red pigment, prodigiosin, which has anticancer and immunosuppressive activities. However, the unique chemical structure of this pigment makes commercial production time consuming and costly. This work describes a novel purification method that reduces processing time to obtain prodigiosin from Serratia. A culture of FM001 was grown overnight and allowed to sit undisturbed for 5 days at 30°C to maximize pigment production. The culture was mixed with methanol and centrifuged. The supernatant liquid was collected and filtered. The methanol was evaporated and the resulting product was isolated using chromatography techniques. The chromatographic solvent was evaporated from the purified product and subjected to chemical analysis. The analysis confirmed isolation of the purified product. The purification technique described offers a potentially cheaper method of purification of prodigiosin from bacterial broth. Initial observation points to a higher yield of prodigiosin per wet cell weight than previously reported. Work is underway to validate these findings.

### *Diphenylthiazoles with Various N-F Reagents*

**Student:** Julie M. Hatfield, Chemistry and Physics

**Faculty Sponsor:** Dr. Chad E. Stephens, Chemistry & Physics

**I**n our previous research, 2,4-diphenylthiazoles were successfully fluorinated at the 5-position using the N-F reagent Accufluor. We are now interested in fluorin-

ating the 2,5-diphenylthiazole isomers, the formation of which was accomplished using the Heck reaction of thiazole with bromobenzene. Fluorination of these compounds by electrophilic aromatic substitution using N-F reagents mainly took place at the C-4 position of the thiazole. In our initial fluorinations using Selectfluor® and Accufluor®, a unique trifluorinated product, 4,4,5-trifluoro-2,5-diphenylthiazole, also formed. As it was very difficult to separate the trifluorinated product from the monofluorinated product, other fluorinating conditions were pursued. Ultimately, we found that the use of the N-F reagent N-fluorobenzenesulfonimide (NFS) in bromobenzene near reflux gave the monofluorinated product with good selectivity (21.3% yield, 99.5% pure). In addition, we found that a reaction using no solvent, excess NFS, and that ran for only 45 minutes yielded trifluorinated product in a near-selective manner (36.9% yield, 93.5% pure). Unfortunately, the reactions were always incomplete, even with an excess amount of NFS, and thus isolated yields were low. Nevertheless, this research has shown that monofluorination, as well as the unique trifluorination, can be selectively achieved. This research has significance because fluorinated heterocycles have favorable pharmaceutical and agricultural properties.

### *Synthesis of Diarylsulfone Derivatives As Potential Non-Nucleoside Inhibitors of Human Betaherpesviruses*

**Student:** Daniel Gerry, Chemistry & Physics

**Faculty Sponsor:** Dr. Chad E. Stephens, Chemistry & Physics

**T**he presence of human herpesviruses in the general population is pervasive, with many types infecting a majority of people by adulthood. While the existence of several antiherpetic medications has allowed for control



of herpesvirus infections in many clinical settings, more research is needed to develop drugs with better specificity and lower toxicity. Following up on previous research involving the antiherpetic activity of diarylsulfone derivatives, analogs of one such compound, 2H-3-(4-chlorophenyl)-3,4-dihydro-1,4-benzothiazine-2-carbonitrile-1,1-dioxide, have been synthesized for biological testing. The activity of the lead compound was previously found to depend upon the chlorine atom of the 4-chlorophenyl substituent. By synthesizing ten analogs with varied substituents on the 3-phenyl ring, we have sought to uncover this important aspect of the compound's structure-activity relationship. These analogs are currently undergoing biological testing by a collaborator. In addition to the desired analogues, an unknown side product of the synthetic process was isolated and characterized as the 2 carboxamido derivative. The amide derivatives were found to consist of only the trans-diastereomer, opening a possible synthetic route to a trans-only lead compound or analog, and potentially revealing a specific stereoisomer with enhanced biological activity. At this point, efforts continue toward the preparation and isolation of these cis/trans- stereoisomers.

***Electrophilic Fluorination of 2,5-  
A New Synthesis of the Pyrrolo[2,1-b]quinazoline  
System by Intramolecular N-Arylation***

**Student:** Nisaraporn Suthiwangcharoen, Chemistry & Physics

**Faculty Sponsor:** Dr. Chad E. Stephens, Chemistry & Physics

In our research, we are trying to develop a new route to the pyrrolo[2,1-b] quinazoline heterocyclic ring system. This tricyclic system is found in the natural product vasicinon, which was isolated from *Adhatoda vasica* an evergreen bush used in medicine for cold, cough, bronchitis, and asthma. This ring system has been synthesized before, but using a procedure that involved different bond formation. Our approach involves a two-step synthesis, with the key step being a Pd-catalyzed intramolecular N-arylation. The first step is the Gewald Synthesis of a 2-aminopyrrole containing an ortho-bromo benzyl group at the 1-position. The second step involves the intramolecular arylation of the pyrrole NH<sub>2</sub> group using a Pd catalyst, xantphos as ligand, and Cs<sub>2</sub>CO<sub>3</sub> as base. When a 3-phenylsulfonyl group was present on the pyrrole, the N-arylation gave the tricyclic system in 49 % purified yield; however, when a 3-CN group was present, no tricyclic was formed. In addition to tricyclic formation, several intermolecular N-arylations of the 2-aminopyrroles were performed in good yield. Thus far, these intermolecular couplings have occurred only when using aryl bromides containing electron withdrawing substituents. Efforts are underway to optimize the conditions in order to expand the scope of the reaction.



Session 1, Panel 3:

# Constructions

## ***Changes and Possible Solutions of Teaching in a Multicultural Classroom in the U.S.A. in the 1970s – 1990s***

**Student:** Shazia Khan, Education

**Faculty Sponsor:** Dr. Charles Jackson, Education

**M**ulticulturalism will be defined and two definitions of multicultural education will be outlined and their implications are discussed. Two experiments that were carried out in the U.S.A. in the 1970s – 1990s will be summarized as well as the challenges European-American teachers face in multicultural classrooms, according to the research. An attempt will be made to explain why teachers have difficulty in overcoming these challenges by examining statistics of teacher and student cultural disparities. The role of the teacher in a multicultural cultural classroom is also discussed along with some ideas researchers and teachers have to assist the challenged teachers to achieve a non-prejudiced, desegregated non-biased classroom.

## ***Time, Space, Language, and Bergsonian Freedom in Joyce and Woolf***

**Student:** James Grant, English and Foreign Languages

**Faculty Sponsor:** Grace Heck, English and Foreign Languages

**I**n the early twentieth century many Modernist authors were beginning to experiment with the composition of the novel. The style termed “stream-of-consciousness” was one particular experiment in this period. The stream of consciousness novel, however, is often considered a difficult read and is pushed aside by readers for more mainstream works. The author has taken the philosophies of Henri Bergson, an existentialist/metaphysical philosopher contemporary to this period of the twentieth century, concerning time, space, freedom, and reality and applied them to Virginia Woolf’s *Mrs. Dalloway* and James Joyce’s *Ulysses* for a new look at the freedom within the constraints of time and space that these novels attempt to achieve, as well as the methods by which they attempted to achieve that freedom. Both primary and secondary literary sources were used to gain a clear understanding of how the works of Joyce, Woolf, and Bergson work together to present one view of how time, space, and reality are perceived and how true freedom is experienced within them in the context of the stream-of-consciousness novel.

## ***The Modernists Novels Influence on Experimentalism in Spanish Novels***

**Student:** William Larry Napier,

English and Foreign Languages

**Faculty Sponsor:** Dr. Jana Sandarg,

English and Foreign Languages

**M**ovements within literature have beginning points, but their influence often extends beyond the geographical as well as historical period in which they were born. The study of such effects can be of great interest when one considers the world wide patterns of influence in literature. This past semester I was able to discover one such pattern while studying Spanish literature in Spain. The modernist movement in English literature occurred in the beginning of the twentieth century lasting for several decades. The same is not true of Spanish literature, which failed to discover the ideas of modernism until much later in the sixties. The influence of the modernist novelists, William Faulkner and James Joyce, on the development of Experimentalist novelists, Juan Goytisolo and Gonzalo Ballester, displays the fact that time and language are no barriers to the spread of literary ideas and movements. I hope to explore the historical and political situations that lead to this latent development in Spanish literature of what had occurred decades before in English. Also, I want to explore the extent of the influence and the similarities or differences in form and technique that appear.

## ***Kenneth Burke: Idea, Image and Identification***

**Student:** Tillman Russell, Communications

**Faculty Sponsor:** Dr. Edgar Johnson, Communications

**I**deas and images are two sides of the same coin. As Aristotle explained, human beings cannot think without images. Images provide the mind with the conceptual apparatus to gain insights into the structures of reality. Furthermore, they are the key to understanding the connection between symbols and the rhetorical process. As Kenneth Burke explains in his masterpiece, *A Rhetoric of Motives*, this subtle insight contains deep and profound implications for the student of rhetoric. Burke presents a philosophy of rhetoric that attempts to explore, in metaphysical terminology, the persuasive order, development and interpenetration of image and idea within the human linguistic structure. The foregoing analysis will delineate Burke’s notion of man as homo dialecticus, his



understanding of the way that “orders of terminology” lay the groundwork for social hierarchy, and how this social

hierarchy provides the conditions for the rhetorical actions of identification and con-substantiality.

Session 2, Panel 1:

# Cognitions

## ***Majority Rule Versus Consensus Rule in Group Decision Making***

**Students:** Corey Boswell and Nicole N. Kriegel,  
Psychology

**Faculty Sponsors:** Dr. Stephen H. Hobbs, Psychology, &  
Dr. William Lawless, Psychology and Mathematics,  
Paine College

When faced with decision making, some groups and organizations do so by majority rule; others operate by consensus. It is known that consensus tends to encourage cooperation, while majority rule encourages discourse. Surprisingly, Lawless et al. (2006) have suggested that majority rule is more efficient, even while increasing the quality of decisions reached. The present study was undertaken to evaluate those predictions. Data were collected from student volunteers at two southeastern colleges. Participants were randomly assigned to three-person groups to make a series of decisions using either a majority- or consensus-rule approach. Groups had a maximum of 30 minutes to consider up to 25 issues relevant to students, such as campus parking. After each decision was reached, participants rated aspects of the decision-making process. No group reached a decision on all 25 topics. Consensus-rule groups reached statistically fewer decisions than majority-rule groups. Analysis also revealed that consensus-rule participants contributed more comments to decisions reached than did those in majority-rule groups. Results suggest that when time is a critical issue, majority rule may be a more efficient approach to reaching decisions. The present study is currently employing independent raters to evaluate whether decision quality is sacrificed or enhanced under majority rule.

## ***A Phase Transition in the Minority Game***

**Student:** Rebecca Sawyer, Chemistry & Physics

**Faculty Sponsor:** Dr. Andy Hauger, Chemistry & Physics

The Minority Game (MG) was first proposed by Zhang and Challet in 1998. The MG considers situations in which it is advantageous for the individual to be

in the minority, for example filling a specialized niche in the market place or on a team. Each agent or player in the game makes a choice at each turn about which group they join. After all agents have made their choice, agents in the minority group are rewarded. The agents make decisions by trying to exploit patterns learned from the outcomes of previous turns. The number of turns considered by an agent defines their memory size. We have written a program to simulate the MG. One might expect that any particular agent would benefit from a larger memory size. Our results show a phase transition where having access to too much information (i.e. a longer memory size) is not beneficial. The details of the model and the nature of this transition will be discussed.

## ***A Computer Information System to Aid Psychological Experiments on Impulsive Buying Behavior***

**Students:** Steven Jackson and Charles Ryan, Computer Science

**Faculty Sponsors:** Dr. Neal Wagner, Computer Science  
and Dr. Sabina Widner, Psychology

As part of a psychological study on impulsive buying behavior undertaken by Dr. Widner and colleagues, participants will view pictures and brief descriptions of a variety of items from catalogs. They will be asked to report how much they would pay for 19 items for purchase, as well as how desirable they find the products. Each participant will be timed as they complete the pricing task. The hypothesis is that those scoring high on impulsive buying behavior questionnaires will complete the task quicker than those scoring low on this construct. Initially it was planned that experiments be administered manually by one of the researchers, however this presented a number of problems including the possibility of human error while recording statistics and the fact that participants would realize that they are being timed which might cause them to rush their answers. A computer information system was built to automatically display each of the 19 purchase



items with applicable questions one at a time and record the time taken to answer. The system also generates an Excel spreadsheet report containing pertinent statistics for all participants who have completed the experiment on a particular machine.

### ***Malnutrition:***

#### ***A Threat to Cognitive Development***

**Student:** Kenya Waltower, Education

**Faculty Sponsor:** Dr. Charles Jackson, Education

**M**alnutrition is an epidemic of global proportion. Unfortunately, of the many that go hungry around the world, more than 300 million are children.

It is estimated that in the United States, 37 million people go hungry daily, and out of those, 13 million are children (Litchman, 2006). This paper will examine the experts' definition of malnutrition and find out what is meant by critical periods, in terms of cognitive development in children. Research studies will also give insight not only to malnutrition, but other factors that may influence diminished learning potential. Efforts at the national and global level to combat hunger will also be examined. To conclude, this paper will reveal expert suggestions that attempt to provide solutions to prevent further malnourishment, and if not eradicated, show the impact malnourishment will have on the world's children.

Session 2, Panel 2:

## By the Numbers

### ***Computational Model of the Leaky Pendulum***

**Student:** Tanya Mikulas, Chemistry & Physics

**Faculty Sponsor:** Dr. Andy Hauger, Chemistry & Physics

**T**he problem of the leaky pendulum was first posed by Halliday and Resnick in 1966. The leaky pendulum is a physical pendulum whose mass and effective length change with time. The period of such a pendulum has been studied both experimentally and theoretically for small amplitudes. We have recently expanded on that research. Specifically, we have numerically studied the large amplitude oscillatory motion of the leaky pendulum. Our results will show the period as a function of time and will be compared to previously published research.

### ***Optimization of the Heterocyclic Synthesis of 2-Amino-4,5-Diphenylfuran-3-Carbonitrile for the Organic Teaching Laboratory***

**Student:** Paul S. Howell, Chemistry & Physics

**Faculty Sponsor:** Dr. Chad E. Stephens,  
Chemistry & Physics

**A**s nearly 50% of known organic compounds are heterocyclic, there exists a need to instruct future organic chemists about these compounds. Of the many examples, 2-amino furans containing electron withdrawing groups at the 3 position are versatile starting points for heterocyclic and medicinal chemistry. Gewald and later Termnikova introduced a one pot synthesis for these compounds, with the title compound prepared by reaction of benzoin with malononitrile. Our research was to follow and modify one of these established methods to develop a

heterocyclic synthesis experiment for undergraduate organic chemistry students. The original procedures required long steps, and when repeated gave poor yields in our hands. To optimize the time and product yield a survey of bases and different methods was performed. The result was a variation on Termnikova's procedure using sonication, greatly reducing the reaction time, and pyrrolidine or piperidine as an organic base to give the aminofuran in 75% yield. The experiment was subsequently used in a second semester organic chemistry laboratory. The students followed the process and collected their results, while under observation. Conclusions drawn from the student laboratory indicate a need to emphasize certain procedural steps, and that the lab was viable as a teaching tool.

### ***A Numerical Analysis of a Water Rocket***

**Students:** Allison Reagan and Angela Davis, Chemistry & Physics

**Faculty Sponsor:** Dr. Andy Hauger, Chemistry & Physics

**W**ater rockets have become popular among hobbyists and rocket enthusiasts, but such rockets have complicated and rarely understood properties behind their motion. These water rockets can obtain impressive speeds and altitudes based on how they are built, water and air pressures, and their mass. Additionally, there are variable external conditions which determine the actual motion of the rocket. It is possible to derive an exact solution for this motion under simplified conditions of constant propellant pressure and ignoring air resistance. We have completed a numerical analysis of the water rocket which includes such complicating factors as decreasing propellant pressure and air resistance. The



results of this analysis will be compared to the simplified case and to results obtained by measuring the motion of an actual rocket. The rocket was launched vertically and tracked using standard video-point software.

### ***A Numerical Study of the Vacuum Cannon***

Student: Daniel Rodriguez, Chemistry & Physics  
Faculty Sponsor: Dr. Andy Hauger, Chemistry & Physics

The vacuum cannon can be used to propel small projectiles, such as ping-pong balls, to velocities approaching the speed of sound. Because of their crowd appeal these devices have become popular tools used in demonstrating the physics of air pressure. A recent theoretical study of the vacuum cannon shows large discrepancies between the predicted ping-pong ball velocity and the measured velocity. The predicted velocity is consistently larger than the measured velocity by about 20%. The model used in that study ignores air resistance and pressure buildup in the tube during the launch. Both of these factors would tend to cause a decrease in the predicted velocity. We have completed a numerical study which includes these factors. The predicted velocities are now in better agreement with those determined experimentally. The details of this numerical study will be presented

### ***Equity-Linked CDs: Risk and Return from an Investor's Perspective***

Student: John Thadford Jackson, Business  
Faculty Sponsor: Dr. Peter Basciano,  
James Hull College of Business

It has been estimated that banks will sell \$2.5 billion in equity-linked certificates of deposit in 2007. An examination of the financial engineering literature provides a fruitful glimpse of these instruments from an investment bank's perspective. However the literature of the financial planning community provides little illumination of these instruments which are growing in popularity and complexity, but which remain attractive to individual, unsophisticated investors. This paper presents a short history of the equity-linked certificate of deposit (ELCD), exposes the reader to the wide variety of products offered under this moniker, examines the risk and return relationships of a variety of these instruments, and finally, compares the risk and return relationships of several currently marketed ELCDs with other common investments. In general, investors should be wary of these investments and, more specifically, should be aware that the unique characteristics of the offering can significantly affect the return on the investment and its associated risk.

Session 2, Panel 3:

## ***By Land and Sea***

### ***A Population Density Study of the Salt Marsh Periwinkle***

Student: Lisa Dunn, Biology  
Faculty Sponsors: Dr. Bruce Saul and Dr. Donna Wear,  
Biology

The salt marsh periwinkle (*Littorina littorina*) is commonly found on the South Atlantic and Gulf coasts in brackish waters. The periwinkle maintains a cyclic symbiotic relationship with the flourishing marsh grass known as *Spartina* (*Spartina alterniflora*). The periwinkle forages on the detritus found on the stem and blades of living *Spartina*. Populations of the periwinkle were sampled at two localities on St. Catherine's Island, a barrier island located on the Georgia coast. The two locations were randomly sampled once a month using a quadrat square (1mX1m) to estimate the densities of the *Spartina* grass and the associated populations of the periwinkle. We proposed to: (1) determine any potential population and ecological differences among the periwinkle that inhabit short *Spartina*

grass in comparison to tall *Spartina* grass, and (2) determine seasonality differences among the periwinkle populations for both short and tall *Spartina* grass. Experimental results were analyzed by using a Student T-test and a Chi-square Goodness of Fit test. Analysis of the monthly data revealed that the populations of the salt marsh periwinkle were significantly higher in tall *Spartina* grass. Analysis also concluded that salt marsh periwinkle populations were significantly higher in the summer months when compared to the winter months.

### ***Columbia County Landfill Effects on Water Quality of Euchee Creek***

Students: George M Hinnant, Rahul D. Shingh, and  
Jonathon A. Atkins, Biology  
Faculty Sponsor: Dr. Bruce Saul, Biology

The Columbia County landfill is located within the watershed of Euchee Creek. It is hypothesized that chemical factors associated with the landfill could



pose a threat of chemical contamination to the neighboring biotic ecosystem. A previous study of Euchee Creek's water quality in 1997 served as a template for chemical compounds present while the landfill was operational. Our data collection began six months subsequent to the closing of the landfill in July of 2006. Our water sampling locations and tests for inorganic chemical compounds and heavy metals were the same as those collected during the experiment conducted in 1997. The data obtained from our experiment coincided with previous results. This suggests that the Columbia County landfill took the proper precautions to prevent contamination of Euchee Creek.

### ***The Effects of a New Anesthetic on Various Fish Species***

**Students:** Charles Brown, Connie Reynolds, Jeremy Dingman, and Richard Wege, Biology

**Faculty Sponsor:** Dr. Bruce Saul, Biology

**A**qui-S is an Investigational New Animal Drug (INAD) that is used to anesthetize fish to reduce the stress of fish when they are to be handled or transported. Finquel is the only approved anesthetic for use on fish; however, it has a withdrawal (before release) period of 21 days, which is not ideal in many cultured populations and in almost all wildstock populations. Aqui-S is optimal because it does not have a withdrawal period. The purpose of testing Aqui-S is to determine the most appropriate treatment regime to anesthetize a variety of fish species. The fish tested include striped mullet, inland silversides, mummichogs, sheepshead minnows, striped killifish, and sailfin mollies from St. Catherines Island, GA. Stock solutions containing Aqui-S were made using bath concentrations of 20, 40, and 60 percent, and a recovery bucket of ocean water. Eight trials were conducted, and no fish were exposed to more than one concentration. After five minutes in the anesthetic solution, the fish were placed in the recovery bucket to observe behavior. The efficacy of Aqui-S increased as the concentration of the drug increased. Each anesthetized fish recovered within a few minutes when placed in recovery water.

### ***Taste Aversion Phenotype Confirmation with TAP and TAR Strains of Rats***

**Student:** Shalon M. Howard, Psychology

**Faculty Sponsor:** Dr. Stephen H. Hobbs, Psychology

**A**ugusta State University has participated in the development of two specialized strains of rats. Rats were selectively bred to display either a taste

aversion prone (TAP) or taste aversion resistant (TAR) phenotype. These lines of rats have played a role in defining basic neural mechanisms of learning and, more recently, in understanding the addiction process. Unfortunately, these strains were affected by an indwelling pathogen and some animals from each strain were sent to a commercial breeder for rederivation. The purpose of this study was to confirm that the rederived rats still display their respective phenotypes, so that they can continue to be used in future studies. Thirty-two rats, sixteen of the TAP strain and sixteen of the TAR strain, underwent a standard taste aversion paradigm, in which drinking a palatable saccharin solution was paired with an illness inducing agent (cyclophosphamide). Results confirmed that the TAP and TAR strains continue to display their appropriate phenotypes, although the magnitude of aversion in the TAP strain was weaker than previously observed. Subsequent studies are planned to further explore this anomaly.

### ***Refuge-Seeking Responses Induced by Chemical Cues***

**Students:** Liza Negron-Perez and Ngoc-Anh Huynh, Biology

**Faculty Sponsors:** Dr. Bruce Saul and Dane R. Scarff, Biology

**P**redator-prey studies observe the interactions between organisms and their behavioral responses to certain cues, this case being chemical cues. Studies on snail populations of *Physa gyrina* have shown that a significant behavioral response occurs in the presence of injury-related chemicals released from members of the same species. When these chemicals are detected, an instinctive refuge-seeking response is observed. To authenticate these behaviors, an experiment was designed to further test the instinctive actions of the snails with respect to the population size and habitat complexity. We simulated a predator-prey interaction with varying numbers of snail prey. Twelve 11L tanks were filled with 300 ml of water, three of which were designed to be the environmental controls. The first tank had no objects placed in it, the second held gravel and small pebbles, and the third held pieces of broken clay pots (used to mimic areas of refuge the snails may seek when sensing predation). Ten snails were placed in each tank and allowed to acclimate to the new temperature and surroundings. To test the behavior of the snails to chemical cues, increasing predator-prey interactions were simulated. As the concentration of environmental chemicals increased, a more pronounced refuge-seeking response was observed. Each set of snails responded in similar yet different way, depending upon the snails' source of refuge.



# Poster Presentations

## ***The Inhibitory Effects of Au(III) and Ni(II) on Thioredoxin Reductase***

**Student:** Megan E. Arthur, Biology

**Faculty Sponsors:** Dr. Donna Hobbs, Chemistry & Physics, Dr. John C. Wataha, Dr. Regina L. Messer, Dr. Jill B. Lewis, and Petra E. Lockwood, School of Dentistry, Medical College of Georgia

**T**he selenoenzyme thioredoxin reductase (TrxR) maintains redox balance of the protein thioredoxin (Trx), which is critical to cellular processes such as DNA synthesis and gene expression. The activity of TrxR relies on conserved active site cysteine and selenocysteine residues. Because Au(III) and Ni(II) have markedly different affinities for sulfur or selenium, the current study tested the hypothesis that these ions would inhibit TrxR activity to different degrees. TrxR activity was assessed in an in vitro assay system. Au(III) or Ni(II) solutions were added at varying concentrations to determine inhibitory doses. To test the role of S/S<sub>e</sub> binding in inhibition, excess cysteine or selenocysteine was added as a competitive target for the metals. The results demonstrated a clear difference in inhibitory potency of the metal ions: Au(III) inhibited TrxR activity at concentrations above 5 nM whereas Ni(II) concentrations up to 50  $\mu$ M were not inhibitory. However, cysteine and selenocysteine did not mitigate Au(III) inhibition. These results support the hypothesis that some transition metals inhibit TrxR according to their selenium or sulfur affinity, but direct binding of these metals to selenium or sulfur may not account for their inhibitory behavior.

## ***Ni-induced Changes in Oxidative Stress and Inflammatory Signaling Pathways***

**Student:** Adam J. Doss, Biology

**Faculty Sponsor:** Dr. Donna S. Hobbs, Chemistry & Physics

**A**necdotal clinical evidence suggests that periodontitis is intensified in tissues adjacent to restoratives containing Nickel alloys. A possible mechanism for this inflammation is the complexing of Ni(II) from corroded restoratives with lipopolysaccharides (LPS) from plaque within monocytes to increase net secretion of inflammatory cytokines. We have found that Ni(II) and LPS interact in peripheral blood monocytes (PBMs) to increase levels of Nrf2 within the whole cell and within the nucleus. This finding is consistent with our experimental hypothesis that

Ni(II) ions and LPS act together to amplify levels of Nrf2, and Nrf2 target gene products create a nuclear reducing bias, which in turn enhances transcription of inflammatory genes and secretion of specific inflammatory cytokines.

## ***Perceived Sincerity of Compliments as a Function of Self-Esteem, Gender, and Context***

**Students:** Nicole N. Kriegel, Nicci J. Trent, & Kathi J.

Bivens, Psychology

**Faculty Sponsor:** Dr. Deborah S. Richardson, Psychology

**C**ognitive consistency theory suggests that we like to be accurate in our beliefs about ourselves and we tend to support ideas that are in line with our own ideas. We also prefer accurate feedback which reinforces our self-view (Colman & Olver, 1978). Different genders may be judged differently when engaging in ingratiation (Vonk, 2002). This may be due to the nature of what may be gained by ingratiation. Female participants completed a self-esteem scale, then responded to a scenario in which they received a compliment from either a male or a female in either a bar or workplace context followed by a semantic-differential scale containing word pairs such as "honest-dishonest." Results indicated that female complimentors were perceived as more sincere than male complimentors. Individuals with low self-esteem perceived the complimentor to be more sincere than individuals with high self-esteem. Women with low self-esteem perceived a compliment as more sincere in a workplace context than in a bar and those with high self-esteem showed no difference in perception of sincerity of the compliment regardless of what context it was presented to them.

## ***Multiple Sclerosis***

**Student:** Pamela Nelson, Nursing

**Faculty Sponsors:** Jean Balogh, Nursing

**C**ontinuing education is a critical component in providing quality healthcare to patients with Multiple Sclerosis. Multiple Sclerosis (MS) has such a complex nature with life long complications; therefore, nurses are required to be very knowledgeable about the new nursing interventions, current treatments, and medications available for their patients. The nurse must be able to adapt and respond quickly to the physical and cognitive alterations in the patient with MS. Multiple Sclerosis is described as



an autoimmune disease of the central nervous system. MS causes an interruption of nerve impulses as a result of the demyelization of the spinal cord, nerve fibers in the brain and the optic nerves. The nurse's priorities and goals in caring for the patient with MS are to optimize patient's quality of life. Nursing care can be divided into direct delivery of services, counseling, education, and support through the difficult transitional periods. Nurses can enhance the care of MS patients and their knowledge by obtaining an awareness of the complexities of the disease and the many successful management strategies.

### ***Prevalence and Prevention of Cardiovascular Disease in America***

**Student:** Christopher A. Kinsler, Nursing

**Faculty Sponsor:** Professor Jean Balogh, Nursing.

**C**ardiovascular disease (CVD) is the leading cause of death for both men and women in the United States. CVD is a broad term used to describe a clod of conditions affecting the heart, and the arteries and veins that supply it with blood. Almost 2,600 Americans die as result of CVD each day, a staggering 9,490,000 lives lost every year. Current research on the subject breaks risk factors down into modifiable and non-modifiable categories. This presentation focuses on the implications of that research on Americans, and their risk for disease; as well as the vital role nurses play in combating this silent killer. All research was gathered from scholarly, peer-reviewed publications authored by nurses, both clinical and research, who are experts in the field.

### ***Living with Parkinson's Disease***

**Student:** Debrayda G. Bryant, Nursing

**Faculty Sponsor:** Professor Jean Balogh, Nursing

**P**arkinson's disease (PD) originates deep in the brain's substantia nigra area. There are about 400,000 special nerve cells that produce the chemical dopamine, which the brain needs to signal the body for proper muscle control and coordination. PD occurs when these cells are slowly destroyed, causing dopamine production to decrease and the signals to become chaotic. Approximately 1 in 100 people over age 60 have PD, although it strikes an estimated 1 in 250 over age 40. Most instances of PD occur after age 50, although the illness does occur in people between the ages of 30 and 50, or in rare cases at a younger age. The role of the nurse in the management of PD is designed to improve the patient's quality of life and to be an advocate, as well as, a researcher in assessing the signs and symptoms of the patient. The type and severity of symptoms experienced by a person with PD vary with each individual and the stage of PD. Tremors or shaking, often in a hand,

arm, or leg during muscular inactivity are a classic sign. The diagnosis of PD continues to be based on presenting signs and symptoms. Confirmation by an autopsy is the only definitive diagnostic method. No known treatment can stop or reverse the breakdown of nerve cells that causes PD. However, medications may relieve many symptoms of the disease. The nurse's role for a patient with PD is to help allow the patient maintain a safe environment in their daily life and activities. The most important role of the nurse is to provide diligent assessment skills to assess the level of the patient and any ineffectiveness of the therapies provided to the patient.

### ***Heart Disease in Women***

**Student:** Angie Salyers, Nursing

**Faculty Sponsor:** Jean Balogh, Nursing

**H**ear Disease is the number one cause of death for women in the United States. Risk Factors for heart disease include those that are modifiable and those that are non-modifiable. The modifiable risk factors are; physical inactivity, being overweight, smoking, diet, stress, high blood pressure, cholesterol, and blood glucose. Risk factors that are non-modifiable include age, gender, race, and family. The nurse works to educate and encourage women to make appropriate lifestyle modifications to reduce or prevent the occurrence of as many risk factors as possible. Women also need education regarding symptoms, diagnostic test, and treatments that are specific to their biological make up. The recognition of the prevalence of this disease among women, modifying risk factors and proper treatments can lead to better outcomes for women in the United States.

### ***Nurses Educating Patients with Cystic Fibrosis***

**Student:** Stephanie M. Graiser, Nursing

**Faculty Sponsor:** Jean Balogh, Nursing

**C**ystic Fibrosis and nursing care are an exceptional combination. With advances in technology and treatment, cystic fibrosis does not take the lives of children and teenagers at such a young age. Exclusive care is necessary for the affected person with cystic fibrosis (CF) in reference to medical treatment, nursing interventions, psychosocial needs, and family support. People affected by cystic fibrosis have a mutation in a gene called cystic fibrosis transmembrane conductance regulator, CFTR. Sticky, thick mucus causes obstructions and significantly affects the respiratory, gastrointestinal, and reproductive systems. The nurse must fully comprehend the underlying cause of the visible symptoms of CF to further treat and care for a patient with CF. The nurse can educate the parents on the simple noninvasive ways of diagnosing CF. With such



progress in the medical field and patient education provided by the nurse, there are now fewer patients with cystic fibrosis that require hospitalization. Since CF does not have a cure, nurses contribute greatly to decelerate the disease process with detailed teaching and intricate patient care.

### ***Isolation of Antimicrobial Resistant Bacteria in Rae's Creek***

**Students:** Wendy D. Singleton and Brittany Benson, Biology

**Faculty Sponsors:** Dr. Jason Andrus and Dr. Donna Wear, Biology

Contamination of our natural resources is one of the leading environmental concerns we are presently faced with. Water quality tests performed up and downstream of a sewage pipe running through Rae's Creek, showed an increase in nitrate and phosphate levels. An increase in those two levels collectively is often an indication of fecal contamination. Upon further investigation it was discovered that there was a damage sewage pipe leaking into Rae's Creek. The authors began the present research study to determine whether the contamination of Rae's Creek produced antimicrobial resistant bacteria. Water samples were taken near the Camel West Subdivision, up and down stream of the sewage pipe that runs through Rae's Creek. Using sterile water and a filtering technique, a 1:50 dilution of the samples were filtered. The filter paper was plated onto Mackonkey's agar and incubated overnight at 44°C. Colony counts were performed and each colony was plated onto gridded TSA and a TSA with 50 µg/mL of ampicillin and incubated overnight at 44°C. The plates indicated presence of ampicillin resistant bacteria. Genus *Klebsiella* was identified as one of the antimicrobial resistant bacteria. Further tests will be performed to accurately determine the identity of all the bacteria present.

### ***An Analysis of the Transcriptional Regulation of rrn Genes***

**Student:** Christina M. Torres, Biology

**Faculty Sponsor:** Dr. Christine H. Terry, Biology

Transcription, the transfer of information from DNA to RNA, is the first step in gene expression, and is tightly regulated to insure that genes are not expressed under inappropriate conditions. In bacteria, ribosomes, the cellular structures that produce proteins, are dependent on transcription of *rrn* genes. Protein synthesis is an energy expensive process; therefore transcription of these genes is highly dependent on environmental conditions. Previous studies of the *rrn* genes in the bacterium *Escherichia coli* have laid a strong foundation for our understanding of transcription. As the *rrn* genes have proven to be a successful

model for studying transcription, we are investigating these genes in other bacterial species to learn more about the factors involved in transcription regulation. We are studying transcription in *Serratia*, a Gram-negative bacterium that produces prodigiosin (a red pigment with potential anti-cancer and anti-viral properties). We have determined the doubling rate of *Serratia* under several different growth conditions and are cloning the *rrn* genes in order to compare their activity to those of other bacteria species. These studies will contribute: (i.) to our understanding of transcription in general and (ii.) to research currently being undertaken to understand the regulation of genes involved in prodigiosin production.

### ***Habitat Preferences of Pen-raised Northern Bobwhite Quail (Colinus virginianus)***

**Student:** Patrick Smith and Chris Flakes, Biology

**Faculty sponsor:** David K. Saunders, Biology

Wildlife managers have to supplement dwindling native populations of northern bobwhite quail (*Colinus virginianus*) with pen-raised birds. The pattern of movement and habitat preference of wild *C. virginianus* is well documented, but little is known about the niche of pen-raised bobwhites. To better understand the habitat and home-range of pen-raised quail, 113 birds were leg-banded and released in an area that has been managed for early succession plant growth and low timber density. Five release sites were identified based upon their suitability for wild *C. virginianus*. At each site 20 to 25 pen-raised birds were released with one bird per site fitted with a 6-gram necklace-style transmitter. After a month, a decline in the number of released birds was found. Numerous disappearances could be attributed to predation. The remainder of the released birds left each of the five release sites for much denser forest with little to no early succession plant life. Because the pen-raised *C. virginianus* left what is considered optimal wild bird habitat, suggests that the pen-raised quail might have different survival needs than wild *C. virginianus*. Various pressures could have lead to the mass departure of pen-raised *C. virginianus* such as predation or unfamiliar surroundings.

### ***An analysis of heavy metals in three trophic levels of fish in Rae's Creek, Augusta, GA***

**Students:** Preston Crews Garrick McGrath, Biology

**Faculty Sponsor:** Donna Wear, Biology

We measured concentrations of arsenic, mercury, and selenium in muscle tissue of three species of fish, bream (*Lepomis* sp.), bass (*Micropterus* sp.) and catfish (*Ictalurus* sp.), harvested from two locations on Rae's Creek, Augusta, GA. High concentrations of mercury were found in bass



(>1 mg/kg) and catfish (0.7 mg/kg) at both locations. Lower concentrations of mercury were found in bream (0.3 mg/kg). The Georgia Environmental Protection Division suggests that at these concentrations of mercury, consumption of bass and catfish should be limited to less than 1 X per month. Consumption of bream should be limited to no more than 1 X per week. There were no diet restrictions for consumption of these fish species regarding arsenic or selenium at either site. We are currently investigating the source of mercury contamination on Rae's Creek.

***A Collaborative Service Learning Project  
Between Freshman Academy Teachers  
at Laney High School and  
ASU Special Education Undergraduates***

**Students:** Sara Beth Mullis & Kathy Jarchow, Education

**Faculty Sponsors:** Dr. Paulette Harris & Dr. Alice  
Pollingue, Education

**D**uring spring, 2007, undergraduate Special Education students were paired with Laney High School Freshmen Academy teachers. The purpose behind the pairings was for the special education students to improve the study skills of all Laney Freshmen Academy students. ASU special education students demonstrated to Laney freshmen how to use agenda planners to make the most of their study time. The Laney teachers felt that most, if not all, of the freshmen would profit from ways to improve their study skills.



# Notes