



**PENN STATE BEHREND - SIGMA XI  
2004  
THIRTEENTH ANNUAL  
UNDERGRADUATE STUDENT RESEARCH  
AND  
CREATIVE ACCOMPLISHMENT CONFERENCE  
ABSTRACT BOOK**

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### **Illusions – Seeing Beyond the Obvious**

Glenn R. Melvin (Kong Ho), University of Pittsburgh at Bradford, Humanities Division – Art

Do we see the obvious, what is in front of us, or can we see what is beyond? Seeing what is beyond the surface of every day areas was the undertaking of this endeavor. Looking beyond into the inner soul – in this case an area that runs through the Pitt-Bradford campus – these questions were explored with the use of digital photography. The final presentation encompasses sights and sounds, a blend of Impressionistic-like images with recorded sounds captured from the stream and nature, with ethereal music to intermingle the aspects and show the observer what can be seen if they take the time to stop and look. Every image is an original created for this project with the help of a computer only to size, color correct, and layer. No computer program filters or special effect items were used. All of these images had to be original. They had to be what the artist imagined looking beyond the physical and into the realm of nature's soul.

### **Detecting Daunomycin Induced Intrachromosomal Recombination in *Saccharomyces cerevisiae* Using a Del Assay**

Jafa Armagost and Alexis R. Snow (William Mackay), Edinboro University, Department of Biological Sciences – Biology

For more than thirty years, daunomycin has represented one of the most commonly used classes of anticancer drugs. It is known that daunomycin interacts with DNA in a very complex manner. Studies in our lab have shown that daunomycin can induce mutations in the bacterium *Salmonella typhimurium*. The objective of this study is to use a deletion (Del) assay to test the role of DNA repair systems in the recognition and removal of mutagenic daunomycin-induced DNA adducts in a more complex eukaryotic cell by analyzing a DNA recombination system in the yeast *Saccharomyces cerevisiae*.

### **RAPD Marker Amplification and Analysis for Predicting Ectomycorrhizal Symbiosis**

Therese M. Butkewich and Kari Thompson (Jeffrey Taylor), Slippery Rock University, College of Health, Environment, and Science – Biology

The purpose of this study is to identify molecular markers in plant and fungal species that predict whether or not a successful ectomycorrhizal association can be formed. Molecular markers, while generally not genes, indicate much about the organisms they are found in. They have been used previously in species identification, finding genes, and discrimination between individuals. Using molecular markers to determine the potential for mycorrhizal formation would be of great use for the silviculture industry. DNA was obtained from the plants and fungi using E.Z.N.A. Miniprep kits. Molecular markers were then produced by the polymerase chain reaction, or PCR, via the RAPD (random amplified polymorphic DNA) protocol. RAPD primers are advantageous in that they produce many bands and require no previous sequence knowledge. Additionally, RAPD primers can be tested on any organism, which was a valuable cost-saving measure in this study. Following PCR, the products were analyzed by electrophoresis and band sizes produced by each RAPD primer were recorded. Analysis of the PCR products to identify those that correlate with positive or negative ectomycorrhizae formation is underway.

### ***Helicobacter pylori* Response to Environmental Cues**

Andrew J. Carmosino<sup>1</sup>, Eric M. Torres<sup>2</sup>, and Steven R. Blanke<sup>2</sup> (Steven Ropski<sup>1</sup>)<sup>1</sup>Gannon University, College of Sciences, Engineering, and Health Sciences; and <sup>2</sup>University of Houston – Biology

Some bacterial pathogens have the ability to survive in drastically different environments. Previous studies revealed that some bacteria are able to adapt to different environments by a phase variation mechanism. *Helicobacter pylori* is a gram negative gastrointestinal pathogen that has been implicated in a number of diseases. Previous studies have shown that *H. pylori* has two morphologically distinct forms (phase variants) termed S and L. It was hypothesized that *H. pylori* would adapt to the harsh environment of the stomach by phase variation. In this study, the response of these variants to a number of physiologically relevant factors was tested. The data suggests that differences in infectivity and differences in response to oxygen, mucin, and nutrient stress allow the S variant to survive better in the host environment. Initial observations suggest that soluble cholesterol is a factor that may induce phase transition. Collectively, this work has better characterized the S and L variants and their response to environmental factors, and shed insight into the mechanism by which *H. pylori* may use phase variation to colonize the stomach.

### **The Utilization of the Polymerase Chain Reaction and DNA Sequencing Technology to Compare the mtDNA Gene Order of the *Branta canadensis* and *Branta bernicla***

Eddie J. Disantis, Adam R. Snider, Joshua C. Snyder, Andrew J. Senecal, Craig A. Mackaness, and Byron P. Vaughn, (Durwood Ray and Frederic Brenner), Grove City College, Departments of Biology and Chemistry – Biochemistry and Molecular Biology

Past Genomic Research, specifically Mitochondrial DNA (mtDNA), in migratory birds has been directed towards finding single nucleotide polymorphisms (SNP) within different populations to track migratory pathways. The purpose of this research is to completely sequence each mtDNA genome to compare gene order and derive a phylogenetic relationship between species. Research is carried out by first isolating and purifying mtDNA from liver tissue taken from the *Branta canadensis* (Canadian goose) and *Branta bernicla* (black brant). A traditional polymerase chain reaction is used to amplify the DNA. Next, a Cycle Sequencing Reaction is used in conjunction with an automated DNA sequencer to derive a set of sequences. These sequences are analyzed with DNA software to construct a contiguous sequence. Ultimately the contiguous sequences will be used to compare phylogenetic relationships between species.

### **The Effects on Mycorrhizal Inoculation on *Capsicum chinense* Growth**

Akash Fernando (Jeffrey Taylor), Slippery Rock University, College of Health, Environment, and Science – Biology

Vesicular-arbuscular mycorrhizal fungi have obligatory symbiotic relationship with plants. The presence of mycorrhizal fungi has been found to increase the absorption of selected nutrients, hence maximizing growth. As a result, it is widely assumed that the mycorrhizal fungi universally aid the plant to absorb all nutrients from soil. Despite a lack of studies to confirm these assumptions, commercial mycorrhizal inoculums are used to maximize crop production in many species. Clearly, work is needed to determine which plants will benefit, and with which fungal inoculums. The plant under observation in this study is *Capsicum chinense*, famous for producing the habanero pepper that is often regarded as the hottest of the hot peppers. While the presence of vesicular-arbuscular association on *C. chinense* is established, the benefit of these is unclear. In order to analyze the effects of commercial mycorrhizal inoculums on *C. chinense*, sample plants were grown in ordinary soil, soil that contained mycorrhizal inoculums and autoclaved soil. To assess fungal impact, the growth rate and root-to-shoot ratio under various treatments will be determined. Likewise, the degree of fungal association will be assessed. It is our hope that this study will lead to a more complete understanding of the benefit of mycorrhizal association for *C. chinense* plants.

**A Putative Kinesin Light Chain Alters Plant Growth and Chloroplast Movement in *Arabidopsis thaliana***  
Amanda Gruver (Michael Campbell), Penn State Behrend, School of Science - Biology

A random clone (*NDPI*) was isolated from a cDNA library produced from dormant potato meristems. The full-length cDNA was 1463 base pairs in length and encoded for a putative polypeptide composed of 421 amino acids. Further analysis on *NDPI* was conducted in *Arabidopsis thaliana* because a single copy homologue exists at At5g02130. The *A. thaliana* and potato *NDPI* homologues are highly similar and share greater than 50% identical and 73% conserved amino acids. Blast analysis of both the *A. thaliana* and potato *NDPI* genes demonstrated sequence similarities to kinesin light chain proteins in *Nostoc* sp., and the conserved KLC domain KOG1840. Examination of an *A. thaliana* T-DNA knockout mutant of the *NDPI* locus reveals that the loss of *NDPI* resulted in growth rate reduction of 93% in comparison to controls. Additionally, loss of *NDPI* results in an increased sensitivity to salt. Mutant plants exposed to 200  $\mu\text{mol/m}^2\text{s}$  of light produced over seven times the anthocyanin seen in wild type plants. Rate of chloroplast movement was 93% reduced in *ndp1* plants. A fusion construct of the *pNDPI* gene and the PinPoint Xa-1 expression vector produced a viable *pNDP* protein. We hypothesize that *NDPI* encodes for a putative kinesin light chain that controls chloroplast movement in the cell.

**Response to Color and Grey-Scale Video Playback by the Cichlid Fish *Thorichthys (Cichlasoma) meeki***  
Jennifer Halchak (Simon Beeching), Slippery Rock University, College of Health, Environment, and Science – Biology

Video playback allows researchers to alter visual characteristics of animals without otherwise manipulating them. In this study, video playback was employed to examine how color effects intraspecific signaling in the highly pigmented *Thorichthys (Cichlasoma) meeki*. Ten subjects (six males, four females) viewed a video loop displayed simultaneously in both natural color and grey-scale. Each subject's aquarium was divided into three zones, one near each video monitor, and a central 'neutral' zone. The time spent in each zone, frequency of entrances, along with occurrence of stereotyped activities was recorded during video playback. Results indicate that overall, more time was spent in the left zone of the tank, which corresponds with the color video playback. The smallest proportion of time was spent in the neutral zone. Orientation, lateral and frontal displays, and bites were also noted. More bites and displays occurred during the second half of the video playback. This primary research shows that specific behaviors of *Thorichthys meeki* can be examined using video playback techniques.

**The Effects of Staphylococcal Virulence Factors on the Chemotaxis of Polymorphonuclear Leukocytes**  
Christine Haller (Mary Dominiecki), Slippery Rock University, Department of Biology – Biology

*Staphylococcus aureus* are part of the normal flora of many individuals but also have the potential to cause many different types of intravascular and extravascular infections including septicemia, wound infections, and endocarditis. Many *S. aureus* strains are resistant to virtually all of the available antibiotics. *S. aureus* can express many different virulence factors including toxins, capsule, and extracellular matrix-binding proteins that are believed to affect the outcome of infection. Phagocytosis of *S. aureus* by polymorphonuclear leukocytes (PMN) is thought to be the main mechanism of bacterial clearance and killing. PMN have the ability to move toward bacteria and even into tissues through a process called chemotaxis and diapedesis. It is unclear which staphylococcal virulence factors may induce chemotaxis of PMN. In this study, we analyze the ability of strains of *S. aureus* differing in capsule expression, expression of fibrinogen-binding proteins and expression of *sar* (a global regulator of virulence expression) to induce chemotaxis of PMN using transwell assays. Bacteria and bacterial supernatant were used as possible chemoattractants and chemotaxis was assessed through staining and microscopic analyses. These studies will help us understand how the body deals with staphylococcal infections.

### **Bat Survey on Gannon University's Campus**

Jackie D. Metheny (Steven Ropski), Gannon University, College of Sciences, Engineering, and Health Sciences – Biology

Few studies have documented small clusters of little brown bats (*Myotis lucifugus*) utilizing building surfaces in urban settings. During the summer of 2003 a survey of Gannon University's campus located in Erie, Pennsylvania, was conducted to determine the abundance and species of the bat population roosting on campus buildings. The study focused on the five most popular buildings. Bats were removed from the building surfaces and examined for sex, species identification, and weight determination. In addition, Avinet 2.3 mm celluloid bands were used to tag the bats' wings. The purpose of the study was to (1) locate a suitable area for a bat house with informational kiosk, (2) to determine whether the campus was used as a migratory stop, day roost, or maternity roost, and (3) to compare these data with data compiled eight years ago in a similar study.

### **The Roles of Rank, State, and Seasonal Considerations on Caching Behavior in Black-capped Chickadees**

Emily Morse (Margaret Voss), Penn State Behrend, School of Science – Biology

The black-capped chickadee (*Poecile atricapillus*) experiences changing environmental conditions throughout the year that alter optimal foraging behavior. I am exploring the ways in which chickadee foraging decisions may be influenced by physiological state, dominance rank, and time of year. Non-migratory songbirds face a critical trade-off in winter; they should minimize fat reserves to decrease predation, but should maximize fat levels to avoid starvation. As a scatter-hoarder, chickadees store energy supplies outside their bodies by depositing caches of food among scattered locations for later consumption, which reduces the amount of body fat they need to maintain. In spring, chickadees become constrained in a different manner. Females must now allocate their time and energy in a way that maximizes their own reserves, reduces predation risk, and maintains optimal conditions within her nest. The challenge becomes foraging to increase the individual's chance of survival, while incubating her nest at temperatures that promote proper development, increasing the chance that her clutch will survive. In winter, dominance is predicted to be the main effector in determining patterns of foraging behavior. During the nesting season, though, caching and foraging patterns may be predicted by environmental cues such as ambient temperature or prey density, not dominance.

### **Expression of the NDP Gene in Arabidopsis thaliana**

Russell D. Neuner (Michael Campbell) Penn State Erie, The Behrend College, School of Science – Biology

The gene, *NDP*, was recently isolated from potato, *Solanum tuberosum*, and sequenced at Penn State Behrend. Based on sequence similarities, an *NDP* homolog was found in *Arabidopsis thaliana* (thale cress) at the chromosomal location of At5g02130. Knockout mutants of *A. thaliana* that lack a functional *NDP* gene product have a phenotype consisting of slow growth and sensitivity to high light, but the function and expression of the *NDP* gene is not known. My goal was to assess *NDP* expression using real-time polymerase chain reaction (RT-PCR) with total RNA isolated from leaves, roots, stems, flowers, and siliques. RT-PCR was used to compare *NDP* transcript levels to actin (*ACT2*) and glyceraldehyde-3-phosphate dehydrogenase (*GAPDH*). Additionally, RT-PCR was used to measure *NDP* transcript levels in dark-grown and light-grown plants. Results indicate that *NDP* transcript levels vary between major plant tissues and that expression of the *NDP* transcript is light regulated.

## **Homozygous mtSSBP DNA Sequence Reveals 16bp Insertion as Possible Indicator of Breast Cancer Predisposition**

Karen A. Newell, Harmony Tyner, Amanda Kohler, Danielle Lovett, Timothy Blosser, and Jesse Richards (Durwood Ray), Grove City College, Department of Biology – Biochemistry

Previous breast cancer research has indicated that mitochondrial DNA copy number is elevated in metastatic tumors. An integral part of mitochondrial DNA replication, which begins in the D-Loop, is mitochondrial single-stranded binding protein (mtSSBP). mtSSBP is encoded in the nuclear genome, and the resulting protein product holds open the D-Loop. A genetic abnormality in the nuclear DNA coding for mtSSBP could contribute to the observed mtDNA copy number elevation. Our previous research discovered both heterozygous and homozygous allelic forms of the promoter region for this gene. Electrophoretic examination of the heterozygous form revealed the presence of three bands, with a distinct larger band and a shorter doublet. The homozygous sets run closely to the size of this doublet. Sequencing of the upper portion of this doublet revealed the presence of a 16 bp indel (GenBank: AY205592) when compared to the published sequence (GenBank: AC004918). The presence of this indel was unexpected in the homozygous bands. However, sequencing of three of these homozygous sets shows that the 16 bp insertion is present in each set. While this insertion is apparently non-lethal, it could have important implications for breast cancer predisposition. A Southern Blot will provide further insight into this insertion.

## **The Impact of Noise Disturbance on Songbird Nest Distribution, Territory Defense, and Offspring Viability**

Melissa Peters (Margaret Voss), Penn State Behrend, School of Science – Biology

Limited evidence suggests sound disturbance alters the breeding behavior and nest distribution of songbirds. I am exploring this idea by quantifying the distribution, physical condition, stress level, and number of extrapair offspring produced in black-capped chickadees (*Parus atricapillus*) nesting along a sound gradient. I am working with birds that nest in boxes placed along a transect with decreasing traffic noise. The transect runs through the type of fragmented habitat necessary for a road, with normal highway noise at one end and a road bed lacking highway noise at the other. This should allow me to distinguish between the effects of sound disturbance and other types of human disturbance, some of which are beneficial to nesting songbirds (e.g., the creation of open foraging areas). To test whether sound levels affect reproduction in chickadees, I will compare nesting patterns, immunology data, and paternity analysis from the disturbed site with data collected from a similar transect that passes through reforested farmland lacking traffic or construction noise.

## **An Evaluation of Odonata Assemblages in Mitigated and Natural Wetlands**

Jared E. Pierce (Pamela Silver), Penn State Behrend, School of Science – Biology

Construction of the East Side Access Highway resulted in the destruction of natural wetlands on the Penn State Behrend campus. These wetlands were replaced with mitigation retention and terraced wetlands. Preliminary research indicated that these mitigation wetlands were supporting large populations of several species of Odonata (dragonflies and damselflies). I compared the assemblages of Odonata in three natural, three retention, and three terrace wetlands. Odonates were only found in five wetlands (one natural, two retention, and two terrace). The dragonfly genera observed were *Anax* (Aeshnidae) and *Libellula* (Libellulidae), and the damselfly genera observed were *Cordulia* (Cordulidae) and *Coenagrion/Enallagma* (Coenagrionidae). I classified wetlands based on species composition using pairwise Euclidean distances and unweighted pairgroup averages (SAS, version 8.2). Species composition defined three clusters of wetlands, but wetlands did not cluster based on type of wetlands. Cluster 1, composed of wetlands 1, 3, 5 explained 20% of the variability in species composition; cluster 2 (one terraced wetland) with cluster 1 explained 54% of the variability in species composition; cluster 3 (one retention wetland) with clusters 1 and 2 explained 100% of the variability in species composition. I calculated species diversity using the Shannon-Weiner index.  $H'$  ranged from 1.04 in the natural wetland to 0.5 in the retention wetlands. This study provided baseline data, but I was unable to draw conclusions about the comparison of the different wetlands because Odonata samples were too small.

### **The Effects of Virulence Factors on the Susceptibility of *S. aureus* to Phagocytosis**

Lori Seman (Mary Dominiecki), Slippery Rock University, Department of Biology - Biology

*S. aureus* is a major cause of nosocomial infections including septicemia, catheter-related infections, wound infections, and endocarditis. Staphylococcal infections are a growing concern because many of the bacteria responsible for these hospital-acquired infections are resistant to virtually all of the available antibiotics. *S. aureus* can express many different virulence factors including toxins, capsule, and extracellular matrix-binding proteins. It is unclear what effect the expression of individual virulence factors has on the susceptibility of *S. aureus* to phagocytosis by host cells. In this study, we compare the phagocytosis of strains of *S. aureus* differing in capsule expression, expression of fibrinogen-binding proteins, and expression of *sar* (a global regulator of virulence expression) using plasma from dogs, mice, and humans. We have also assessed the requirement of opsonins in this process. Better understanding of these host-pathogen interactions will allow us to develop new drugs to fight infection.

### **The Influence of Secondary Orientation Cues on Emerging Snapping Turtle Hatchlings (*Chelydra serpentina serpentina*) at Presque Isle State Park**

Amy Jo Smith (Jeanette Schnars), Penn State Behrend, School of Science – Biology

Snapping turtle, *Chelydra serpentina serpentina*, hatchlings emerge from their nest and remain "naive" until they become oriented using cues presented by the environment, such as light, geomagnetic, geotropic, or sound. Many species of turtles are positively phototactic and use light as a primary cue. Secondary cues for freshwater turtles have not been studied in the past. This study examined hatchlings' utilization of secondary cues. Eleven nests were located and protected on Presque Isle State Park. Naive hatchlings were collected and tested in three arenas, one natural and two treatment arenas. The first arena was uncontrolled and observed hatchlings' natural orientation from the nest. The treatment arenas controlled light, geotropism, sound, and olfaction. The second arena tested compass heading in the absence of other cues. The third arena tested slope and orientation to light vs. shadows. Data from the natural arena indicated orientation in a northern direction at + 10° from 0° (north). Data analysis from the slope arena indicated no preference for up or downhill, suggesting geotropism was not utilized as a secondary cue. Preference for light or shadows was inconclusive. This study implies that the secondary cues tested may not be a priority for efficient location of water.

### **Characterization and Isolation of Motility Deficient Mutants in *Flavobacterium johnsoniae***

Joshua A. Smith, Christopher C. Smith, and Emily Mausser (David Hunnicutt), Penn State Behrend, School of Science – Biology

Bacterial gliding-motility is a form of cell movement over surfaces. Gliding cells lack cilia, flagella, and other known systems of movement. The bacterium *Flavobacterium johnsoniae* is one of the best studied organisms that exhibit this particular form of motility. To study this organism and its movement, its motility genes are being analyzed. Non-motile mutants of *F. johnsoniae* were created by transposon mutagenesis. A plasmid carrying the transposon Tn4351 was transferred by mating *E. coli* with *F. johnsoniae*. The mutant cells were plated on plates containing erythromycin. This selected for mutants which contained the transposon; Tn4351 carries an erythromycin-resistance gene. Erythromycin-resistant colonies were screened for motility by observing colony morphology and individual cell movement. We generated 999 total erythromycin-resistant colonies and twenty-five of these were non-motile. The plasmids containing known motility genes were introduced into the mutants, in order to determine which contain mutations in previously characterized gliding motility genes. The current focus of this study is to characterize the non-complementing mutants by cloning and sequencing the Tn4351 disrupted genes.

## **The Effect of Body Size and Coloration on the Behavior of Resident Round Gobies (*Neogobius melanostomus*)**

Patricia A. Speares and Lindsey Callahan (Gregory Andraso and Edward Phillips), Gannon University, College of Sciences, Engineering, and Health Sciences – Biology

The round goby is an invasive species of fish that has become a threat to the biodiversity of waterways in the Great Lakes region. Round gobies vary considerably in size, and they are sexually dimorphic during the breeding season, with males adopting distinctive black body coloration and females retaining a light brown, mottled color pattern. These morphological traits and a number of behavioral characteristics make the round goby an attractive species to address the mechanism of sexual selection. This research investigated the effects of intruder body coloration and body size on the behavior of resident gobies. Resident males and females were presented with model intruders that varied in body size and coloration. Responses of residents were videotaped, and several behaviors were quantified. For males, a significant effect of model body size was found for five of the six behaviors, and no significant effect of model coloration was found. For females, a significant effect of model body size was found for three behaviors, and a significant effect of model coloration was found for one behavior. These results suggest that intruder body size may be a more important cue than intruder coloration in eliciting responses from resident round gobies.

## **DNA Isolation for Use in Predicting Ectomycorrhizae Formation**

Kari Thompson and Therese Butkewich (Jeffrey Taylor), Slippery Rock University, College of Health, Environment, and Science – Biology

An ectomycorrhizal relationship is a symbiosis between a woody perennial and a fungus. The plant partner supplies sugars to the fungus, and the fungal partner helps the plant to absorb mineral nutrients from the soil. Being able to predict this type of relationship could be very beneficial to many industries, especially agriculture and silviculture. The goal of our project is to find molecular markers that predict whether or not these relationships will form between particular plant and fungal species. Before this can be done, however, high quality DNA must be obtained in order for further analysis to identify molecular markers. The DNA isolations for both the plant and fungal species were carried out using plant and fungal E.Z.N.A. DNA mini-prep kits. The purity of these isolations was assessed with a spectrometer using 260/280 UV measures. Isolating pure high quality DNA proved to be problematic at times, especially when gymnosperms such as pine were involved. The isolated DNA was used for PCR. Hopefully this will contribute to the discovery of predictive markers for ectomycorrhizae.

## **Behavior of Male Kenyi Cichlid, *Pseudotropheus lombardoi*, in Response to Visual and Olfactory Stimulation by Females**

Matthew D. Venesky (Gregory Andraso and Steven Ropski), Gannon University, College of Sciences, Engineering, and Health Sciences – Biology

The objective of this research was to study the reproductive behavior of male Kenyi cichlids, *Pseudotropheus lombardoi*. The research focused on the influence of visual and olfactory cues of females on the courtship behavior of males. Individual males were presented with females contained in different types of chambers, which varied in the color of their walls (black or clear) and in the type of their walls (solid or perforated). Clear chambers permitted males to receive visual cues, whereas perforated chambers allowed males to receive olfactory cues. Each male was presented with females contained in clear perforated (CP), clear solid (CS), black perforated (BP), and black solid (BS) chambers. Male behaviors were quantified for each treatment and comparisons were made to determine the roles of visual and olfactory cues in male courtship behavior. Two-way analysis of variance revealed that for seven of seven behaviors investigated, wall color had a significant effect on male behavior (clear chambers elicited a greater response than black). Wall type did not have a significant effect on any of the behaviors. This study indicates that males rely on visual cues from females to initiate courtship behavior. Olfactory cues appear to play little role in courtship behavior.

### **The Construction of Genomic DNA Libraries**

Erika E. Weissenfluh, Joshua Smith, and Christopher Smith (David Hunnicutt), Penn State Behrend, School of Science – Biology

Gliding motility is a little understood type of movement exhibited by many bacteria. This is an active form of movement over surfaces without the aid of flagella. *Flavobacterium johnsoniae* has been used as a model system for the study of this movement in recent years. Ten genes involved in gliding motility in *F. johnsoniae* have been identified and analyzed; there are believed to be around twenty. The first part of this research was to generate and characterize non-motile *F. johnsoniae* mutants. The disrupted genes in these mutants are currently being isolated. The process of identifying additional genes required for gliding motility will be aided through the construction of a genomic DNA library for the *F. johnsoniae* wild-type. A DNA library is a collection of cloned DNA fragments that in total contains the entire genome of an organism. DNA will be extracted from CJ101 (the wild-type *F. johnsoniae* strain) and will be partially digested, size fractionated and cloned. The DNA and a vector will be ligated and packaged. This library can be used as a base of study for the non-motile mutants. Analysis of mutant genes requires normal, wild-type copies of those genes for comparison.

### **Novel Synthesis of Titanium Dioxide Nanoparticles**

Mike Corder (Carl Hultman), Gannon University, School of Sciences, Engineering, and Health Sciences – Chemistry

Nanotechnology is a fast-emerging field that will have a marked impact on many areas of technology. The purpose of the present research is to develop ways of reproducibly producing nanoparticles of metal oxides. Nanoparticles of metals oxides will have many applications in the field of nanotechnology. One of the most valuable metal oxides for nanotechnology applications is  $\text{TiO}_2$ . The synthetic route to producing nanoparticles of metal oxides in this research involves reacting  $\text{SiO}_2$  with metal fluorides in formic acid to produce the metal oxide. The preliminary focus of this research is the production of  $\text{TiO}_2$ .

### **Trace Metal Analysis of Snapping Turtles Collected from Erie County, Pennsylvania**

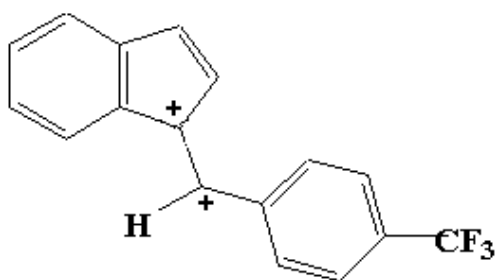
David P. Duberow Jr. (Thomas Spudich and Jeanette Schnars), Penn State Behrend, School of Science – Chemistry

The negative effects of lead contamination on numerous body systems have been researched extensively and are well established. Biomonitoring of environmental lead levels is, therefore, vital in ensuring a safe environment, particularly in regions where aquatic resources serve as a source of food and recreation. To this end, samples of liver and muscle tissues have been harvested from snapping turtles (*Chelydra serpentina serpentina*) collected from Lake Pleasant, Presque Isle Bay, and Siegel Marsh in Erie County, Pennsylvania. These samples were analyzed for lead content using graphite furnace atomic absorption spectroscopy. All tissue samples were dried to determine water content and digested using microwave-assisted acid decomposition prior to analysis. Emphasis was placed on developing a suitable method for reducing biological matrix interferences and obtaining acceptable results. The results of the study were then used to correlate potential lead contamination with diet, age, and location among the turtles. Environmental factors specific to each site were also taken into consideration. In addition, correlation of elemental concentrations in all tissues with elemental concentration in blood is under investigation in an effort to avoid euthanasia in future studies.

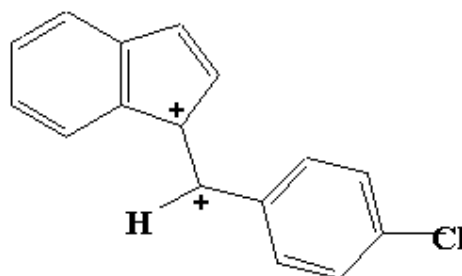
### Synthesis of *p*-Substituted Benzylideneindenes. Antiaromaticity of Indenylidene Dications

Diana Hoover<sup>2</sup>, Jessica Isenberg<sup>1</sup>, and Kyle Williams<sup>1</sup> (Nancy Mills<sup>1</sup>), <sup>1</sup>Trinity University and <sup>2</sup>Edinboro University of Pennsylvania, Department of Chemistry – Chemistry/Forensic Sciences

Fluorenylidene dications have been used by the Mills research group in the past as a means of examining the concept of aromaticity through the study of antiaromatic systems. Indenylidene dications have become the focus of study for a number of reasons, including the decrease in stability as a result of the lack of the second benzene ring in the indenyl system, the possibility of deformation in the 5-membered ring of the indenyl group, and also the presence of protons available to study on said ring. Differences in substituent effects on NICS calculations between fluorenyl and indenyl systems are observed. The synthesis of two target *p*-substituted benzylidene indenyl dications (shown below) is discussed.



*p*-trifluoromethylbenzylidene indene dication



*p*-chlorobenzylidene indene dication

### Cryogenic Treatment of Cutting Tools

Christopher D. Agosti (John Roth), Penn State Behrend, School of Engineering and Engineering Technology – Mechanical Engineering

Cryogenic treatments have been performed on tool steels for nearly two decades in order to obtain longer tool life through improved wear properties. More recently, tungsten carbide has replaced tool steel in many applications due to an increased wear resistance, among other desirable qualities. The intent of the research presented herein was to determine if cryogenic treatments of tungsten carbide cutting tools could improve the tool life of tungsten carbide inserts similar to the improvement of steel. The different processing techniques between the manufacture of tungsten carbide and steel suggest that the improvement of tungsten carbide wear properties, through cryogenic treatments, would occur through a different microstructural mechanism than that of steel. Two types of tungsten carbide inserts were cooled to temperatures below  $-150^{\circ}\text{C}$ , held at this temperature for an extended period of time, and then allowed to return to room temperature. The inserts were then employed in a production line at Saegertown Manufacturing Corporation (SMC) and run under the same cutting conditions as the untreated inserts regularly used in this production line. Over 100,000 parts were produced between the two types of inserts and wear was improved by nearly 300% for one of the insert types.

### **Twisting of Airfoil Sections Using Shape Memory Alloy Wire**

Andrew Detar (Oladipo Onipede), Penn State Behrend, School of Engineering and Engineering Technology – Mechanical Engineering

An innovative way to twist slender structural members is through the use of shape memory alloy (SMA) wires. Twisting is achieved by wrapping SMA wires around a beam in a helical pattern and then heating the wires. The heating causes the wire to change from its martensite state to its austenite state making the wire contract. Since the wire is attached to the beam, the contraction applies a force and consequently twists the beam. Research was conducted to determine the effects of using this method on airfoils. Thin basswood boards were wrapped with SMA wires and tested in the wind tunnel. Measurements of lift and drag were taken while the board underwent twisting. The results of this research proved that this method can be used to adjust the aerodynamic behavior of aerodynamic lifting surfaces.

### **Electricity in Machining Research: Hardness Testing**

Jarred Heigel (John Roth), Penn State Behrend, School of Engineering and Engineering Technology – Mechanical Engineering

Electricity has the potential to significantly raise the internal energy of a part without any significant rise in temperature. Therefore it is believed that a material's properties can be manipulated with the use of electricity. Electricity is already used in welding to fuse two pieces of metal together, so we know that electricity is a useful tool. The challenge is controlling how much is used so that the desired results are obtained without melting the test specimen. The research being conducted examined the effects a DC current has on the hardness of different metals. Using a Rockwell hardness tester, specimens of aluminum, cold-rolled steel, and hot-rolled steel were analyzed as different levels of current were sent through them. Much of the time spent so far has been used to devise ways to control the many unknowns in this experiment, to construct the appropriate ceramic adapter for the hardness tester, and to construct the proper safety equipment to protect both the people performing the experiments and any observers. Favorable results have been found in the samples that have been run, but more tests must be run before any conclusions can be drawn.

### **Driver Information Display System – Making Driving Safer**

Lucas Jessee, Bryan Young, Mark Bristow, and Zac Ryan (Ralph Ford and Randall Fisher), Penn State Behrend, School of Engineering and Engineering Technology – Computer Engineering

With so many hazards waiting on the road ahead, drivers can't afford to take their eyes off the road, even for a split second. When you look at your instrument panel, you have no choice but to take your eyes off the road in front of you. A better interface is needed. Using a Heads Up Display (HUD) integrated into a helmet, motorcyclists and race car drivers wouldn't have to take their eyes off the road to check their speed, RPMs, and other critical measurements. The current products are either incredibly large or very expensive. Neither would be a viable solution for the common person. The result is the Driver Information Display System, which is a HUD that is small enough to be projected onto the visor of a helmet, and affordable to the everyday driver or rider. The technology, such as projectors, wireless communication, microcontrollers, and microdisplays, already exists. Combining these technologies, physics, a few common devices, computer engineering, and a lot of aggressive designing, the Driver Information Display System is born.

### **Testing Effects of Cryogenically Freezing Carbide Inserts at Different Rates**

Joe Piazza (John Roth), Penn State Behrend, School of Engineering and Engineering Technology – Mechanical Engineering

I am currently in the planning stage of my experimental process. I have ten carbide lathe inserts, with four tips each, that I plan on running. I will be keeping all but one of the variables fixed. Fixed variables will include depth of cut and cutting speeds and feeds which are established by the Machinist Handbook. My adjustable variable will be the rate at which we cool the carbides down to  $-150^{\circ}\text{C}$ . I will run eight tips untreated to give a control and I will treat the other carbides at different rates. By collecting different sets of data which include tool wear, temperature readings, and Rockwell hardness testing, I hope to establish an ideal cool-down rate for carbide inserts.

### **Effect of Cryogenic Treatment of Carbide Inserts on Tool Wear**

Nathan D. Russell (John Roth), Penn State Behrend, School of Engineering and Engineering Technology – Mechanical Engineering

Since the end of last semester, a new candidate for cryogenic treatment has emerged. The Scrubgrass Generating Plant, located in Kennerdell, PA, spends over \$100,000 yearly on hammers for their coal crushers. Not only is there a potential to save on the cost of the hammers, there is also a benefit from reduced man-hours spent changing them. The Scrubgrass plant engineer, Jeff Campbell, has expressed interest in increasing the life of these hammers and will consider funding our research if we have some preliminary success with the treatment. The plant gave me five of these hammers to be tested. Two of them were used and the rest were new. One hammer was treated and shipped to the plant for testing. Another new hammer was treated and then a hardness test was performed. Unfortunately, the results thus far are inconclusive and more testing will be required to rule in or out this application of cryogenic treatment. After this testing began, the plant began to have serious problems with the hammers (brand new ones, not treated by me), and was forced to change supplier. These new hammers are forged, as opposed to the cast hammers originally tested. These cost more and give more opportunity for savings.

### **Development of an Interactive Multimedia Module for Dimensioning**

Patrick Slater<sup>1</sup>, Bradley Smith<sup>1</sup>, and Holly Blasko-Drabik<sup>2</sup> (Kathy Holliday-Darr<sup>1</sup> and Dawn Blasko<sup>2</sup>), Penn State Behrend, <sup>1</sup>School of Engineering and Engineering Technology and <sup>2</sup>School of Humanities and Social Sciences – Engineering Graphics

Freshman mechanical engineering technology and plastics engineering technology students are required to take two graphics courses their first year. One of the most difficult and important topics covered is dimensioning. This requires the student to visualize what the 3-dimensional object will look like 2-dimensionally, what features make up the object, design intent, and how the part can be manufactured, then communicate this information in graphical form. The 2001 summer Visualization Assessment and Training (VIZ) team designed an interactive dimensioning module to help students practice their visualization and dimensioning skills. Included in these modules are features giving immediate feedback showing correct and incorrect technique, and guidance as to why certain approaches are correct or incorrect. Lesson 1 was created by the 2002 VIZ team and tested in fall 2002 in the classroom. The 2003 VIZ team worked on creating lessons 2 and 3. Lessons 2 and 3 included circular shapes; Macromedia FreeHand was used to clean up the Pro/ENGINEER files. Macromedia Authorware was used to combine text and images into one interactive module. This year required simple corrections in lesson 1, rewrites of the storyboard for lesson 2, and the creation of lessons 2-3. This year also included the addition of digital photographs of some of the real-life objects.

## **Envisioning Feminism: Female Sexuality and Community in the Works of Mary McCarthy and Wendy Wasserstein**

Molly E. Seremet (Mark Cosdon and Judith Rose), Allegheny College – Theatre and English

Through their incorporation of American political history, authors Mary McCarthy and Wendy Wasserstein create literary and dramatic snapshots of American feminism in their respective works The Group and Uncommon Women and Others. To do so, both writers focus on issues of women's sexuality and community, echoing ideas from second-wave feminism, often in divergent manners. Additionally, McCarthy and Wasserstein also assert a sublimated form of lesbianism through these female communities and through the characters' ultra-competitive interactions with one another. In desiring to emulate one another, these women exhibit yearnings to possess each other, often depicted in a homoerotic manner. To flesh out the nature of these communities and competitions, this study examines both the political climate of actual American feminism, and looks at The Group and Uncommon Women in comparison to writing linked with second-wave feminism, including Millet's Sexual Politics, Koedt's The Myth of the Vaginal Orgasm and Beauvoir's The Second Sex. Thus it becomes apparent that while neither McCarthy nor Wasserstein presents a wholly positive view of the American feminist movement, their critical voices shape the nature of modern feminist polemics, allowing for a deeper understanding of the modern implications of second-wave feminism in literature.

## **GIS Based Analysis of the Chautauqua Drumlin Field, Northwestern Pennsylvania and Western New York**

Adam J. Lanier (Kevin Norton), Penn State Behrend, School of Science – Geology

The Chautauqua drumlin field is an inadequately studied streamline field in the Late Pleistocene Kent ground moraine deposited by the Cary advance of the Erie Ice Lobe. The essential lack of previous work on the field is due mainly to the non-traditional morphology of the drumlins. The drumlins within this field are superimposed on a highly variable pre-existing surface, and have been moderately eroded since formation. To define the drumlin, the slope and three meter contour layers were derived from a 30-meter National Elevation Dataset (NED); as a result the drumlin boundaries were defined by a distinct break in slope. This method provides a more accurate drumlin outline than the traditional topographic map methods. Using the improved boundaries, the morphologic properties of the drumlin and the field itself can be calculated. Initial results indicate that the field covers an area of more than 2500 sq km. Drumlins occur in uplands ranging in elevation from 346 to 628 meters and hold a mean height of 24 meters. Drumlins are oriented at 110 to 180 degrees with elongation ratios averaging 0.32. By improving methods for defining drumlins a more complete understanding of the subglacial environment within the Erie Lobe may be accomplished.

## **Assessing Readiness for Change and Preparing Action Plans for Stakeholders**

Barton L. Towell (Randy Brown and Diane Parente), Penn State Behrend, Sam and Irene Black School of Business – Management

During organizational change efforts, companies often spend a considerable amount of time, money, and other resources to effect the desired change. Because the largest barriers to organizational change are often presented by the people involved, recent research has proposed several different methods for systematically categorizing people who are stakeholders in organizational change. Along with categorizing these people, some models also prescribe ways in which a manager could deal with these people depending on their attitudes towards the proposed change. The purpose of this research was to apply a model, developed in the 1980s, to assess stakeholders' readiness for change and prescribe action plans for each stakeholder based on the individual's assessment. The assessment of stakeholder's attitudes will use a model called the "Readiness for Action Cube," in which stakeholders are placed in different parts of the cube based on their vision, power, and salience. The stakeholder's position in the cube then suggests an action plan for dealing with that person relative to the proposed change. The model will be applied to a proposed change in a large manufacturing firm. The results from this study will show the usefulness of this model for identifying and overcoming barriers to proposed organizational change.

## Study of High School Students and Credit Cards: Consumer Attitudes

Brian Veshecco (Diane Parente and Mary Beth Pinto), Penn State Behrend, Sam and Irene Black School of Business – Marketing

Prior studies of college students and credit cards have focused on the average college student. One such study was done at Penn State Behrend and examined materialism and the use of credit cards. Prior work in this area has raised questions about the impact of the college experience, indirectly calling for the study of incoming freshmen compared to the college-age students. In this study, I will focus my research questions around three main topics. I will compare the difference in materialism between high school and college students, the frequency of purchases, and the differences in the types of purchases made by high school and college students.

## A Generalization of Convex Sets

Rebecca R. Corbin (Larry Downey), Penn State Behrend, School of Science – Mathematics

We generalize the notion of convexity with the following definition:

A set  $B$  is  $k$ -convex if any two points in  $B$  can be joined by  $k$  line segments, all of which are in  $B$ . Our investigation of this new notion has led to the following two fundamental results:

Theorem 1: Let  $C$  be a convex set with nonempty interior, where  $C \subseteq \mathbb{R}^n$ ,  $n \geq 2$ .

If  $S$  is any countable subset of  $C$ , then the set  $C \setminus S$  is 2-convex.

We note here that the set  $S$  can be dense in  $C$ , making the result somewhat surprising. Our second result concerns the  $k$ -convexity of annuli.

Theorem 2: Let  $A_{s,t}$  be an annulus with inner radius  $s$  and outer radius  $t$ . Then  $A_{s,t}$  is  $k$ -convex where

$$k = \left\lceil \frac{\pi}{2 \arccos \frac{s}{t}} + 1 \right\rceil, \text{ ( } \lceil \cdot \rceil \text{ denotes the ceiling function ) .}$$

We feel that the notion of  $k$ -convexity is both interesting and fundamental, and therefore will be a topic considered in the future.

## Polynomial Interpolation of the Runge Function

Elizabeth DeThomas (Antonella Cupillari), Penn State Behrend, School of Science – Mathematics

The common procedure of interpolating the Runge function ( $f(x) = \frac{1}{1+x^2}$ ) using polynomials with equally

spaced points in an interval centered at zero has been proven to be an impossible task, in spite of the simplicity of the function itself. While undergraduate numerical analysis textbooks mention this idiosyncratic behavior, they do not include explanations for it. Indeed a complete description of the reasons behind this problem would use material not typically presented in undergraduate courses. The purpose of the present research was to produce a proof for the reasons behind the failure of usual polynomial interpolation of the Runge function. This proof was to be formulated using methods that could be understood by undergraduate students. Using several different error approximation techniques, I showed first that the error between the interpolating polynomials and the Runge function appears to approach infinity as the number of nodes used in the approximation increases. Then, by exploring in detail one of the error approximation formulas, I was able to prove, using concepts that can be understood by undergraduate students in mathematics, that the error does approach infinity.

## **A Study of Combinatorial Game Theory**

Brett E. Myers (Paul Olson), Penn State Behrend, School of Science – Mathematics

The study of combinatorial game theory has been growing in popularity in recent years. Combinatorial games are those which include two players that move alternately until one of the players is unable to move. The first player unable to move loses. Each move is made based on complete information; therefore no chance moves are involved, such as in rolling dice or shuffling cards. Mathematicians analyze these types of games in order to determine which player is favored to win from a given position in a game. Two games that we are examining closely are 'Blue-Red Hackenbush' and 'Toads and Frogs.' The purpose of this study is to analyze the positions in these games and assign real or nonreal numerical values to the positions. The collection of the real numbers with the nonreal numbers is referred to as *surreal* numbers. Although some of the surreal numbers do not have a place on the real number line, we can say that particular surreal numbers are greater than or less than certain real numbers. As an example, the surreal number denoted by  $\star$  is a value that is greater than any negative real number and less than any positive real number, but the value is not zero. This value,  $\star$ , represents a position in which the player who moves first will win, assuming the player makes the best possible move available every turn. Surreal numbers play an important role in helping to determine the value of specific positions on the playing field. As a result of this study, I will show the complete analysis of several of these games.

## **Mathematical Concepts of Cryptography**

Timothy A. Perkins<sup>1</sup> (Boon Wee Ong<sup>2</sup>), Penn State Behrend, <sup>1</sup>School of Engineering and Engineering Technology and <sup>2</sup>School of Science – Mechanical Engineering

Encrypting and decrypting strings of text or data are both very important processes in today's society and normally involve complex mathematical techniques. We will discuss a brief history of cryptographic mathematics and analyze several methods commonly used including the P.G.P. (pretty good privacy) methods of R.S.A. and D.H. The Elementary Number Theory associated with these methods will also be discussed. The subset sum problem is difficult and will be discussed as well.

## **Calculating Left Ventricle Stroke Efficiency from 3-D Sonometric Data and Aortic Flow Data**

Lee J. Steen (Boon Wee Ong), Penn State Behrend, School of Science – Mathematics

Students in higher level mathematics courses often have trouble with proofs. Proofs are essential to mathematics and make up the concrete structure of areas such as calculus, algebra, and topology. Undergraduate students learning these proofs have very little interactive software to work with. We have created a small software package that offers students a way to interactively review critical areas in Real Analysis. This package includes thorough definitions that form the base structure for Real Analysis. This software is internet based so it allows for professors to put it on the Web for the students to access at any time. The package is divided into several different chapters. At the end of each chapter is an interactive quiz that allows the student(s) to receive instant feedback on their work. There are three types of quizzes we currently are working on completing. One is fill-in-the-blank, where a word must be filled in from a given word bank. The second is a pull-down menu that constructs a thorough proof. The third is a blank proof that has a small text box for the students to place a number to identify a piece of work they intend to put in that spot. This work is identified by a number on a popup menu for them to see. We are currently researching using CGI scripts and also PHP based templates to check the work. We are also researching ways to make the pages dynamic so they can pull different proofs from a database for each chapter. The final software package will be completed by April 12, 2004.

### **Combining the Dynamic Forces of Blood Flow Associated with the Pumping Action of the Heart and Static Forces Associated with Gravity**

John Telliho (Scott Stevens), Penn State Behrend, School of Science – Mathematics

In this project we derive a relationship for blood flow which combines the dynamic forces of pressure gradients generated by the heart and static forces associated with gravity. We then use this relationship in a lumped-parameter model of the human systemic circulatory system. To validate this model, it is necessary to compare the predicted results with those obtained clinically during position-change experiments on earth. For this validation process, the data from Katkov et al. is used. Following the development and validation of the model, a sensitivity analysis will be run on the model parameters to see which parameters have the greatest affect on the simulation process.

### **The Topological Dimension of Limits of Graph Substitutions with More Than One Replacement Graph**

Shun-Hsiang Yang (Michelle Previte), Penn State Behrend, School of Science – Mathematics

By using methods from the mathematical fields of Topology and Real Analysis, I determine the topological dimension of a set  $X$ , where  $X$  is the limit of a sequence of graphs  $G, \mathcal{R}(G), \mathcal{R}^2(G), \mathcal{R}^3(G), \dots$ . These sequences are important because they can be used for data compression. For example, we can consider that a limit set  $X$  represents an exceedingly complicated set of data. Rather than storing the whole  $X$ , we can just store a very simple set  $G$  and a simple rule  $\mathcal{R}$ , which could give  $X$  back to us when we repeatedly apply the rule  $\mathcal{R}$  to  $G$ . Moreover, understanding the topological dimension of  $X$  will help us determine which types of data can be compressed by using this technique. Furthermore, this work will be an essential part of a proof that these limit sets are fractals, a mathematical object of great interest both inside and outside of mathematics.

### **Optimizing the Use of Calculus Techniques to Predict Stock Market Fluctuations**

Megan E. Zuschlag (Joseph Previte), Penn State Behrend, School of Science – Mathematics

Strategies proposed by Amanda Hovis showed that if one knows past data of a stock's price, then one can use techniques from calculus to predict whether the stock's price will increase or decrease in the next minute. The goal of the present research is to extend the work done by Hovis dealing with the use of mathematical applications to predict the rise and fall of stock market prices, to further use information from previous stock prices to produce an optimal buying/selling strategy of stocks in small time frames, and to study the feasibility of implementation of the techniques. The researcher will collect minute-by-minute Level II NASDAQ historical data for each stock of interest, and will use techniques from an upper level math course to estimate an appropriate function to represent the stock's price history. Analysis will then be done on the function's derivatives to determine if the function is increasing or decreasing. The researcher will carry out the derivative test to the fourth derivative for each set of data, and use statistics to analyze various strategies. Finally, the research will examine if buying, as well as selling, in the next minute is feasible in the stock market.

### **Scared Crazy: An Analysis of Mad Masculinity in Horror Films**

John D. Reilly (Ishita Sinha Roy), Allegheny College, Department of Communication Arts – Media Studies

Recent film theory cites the horror film as the primary media text through which social anxieties are conveyed. As the discourse about mental illness has evolved in society, the horror film has reflected these changes with different representations of insanity. The Community Mental Health Centers Act (1963) moved the mentally ill out of hospitals and into society. Consequently, *Halloween's* (1978) mentally ill monster, Michael, is 'othered' as an escaped lunatic who enters the community setting and commits violence. By the 1990s, mental illness had become medicalized and therefore 'invisible.' Thus, *Scream's* (1996) lunatic monster is configured as a seemingly normal deviant who is already in our midst. Simultaneously, these monsters also address anxieties regarding the loss of phallic potency in American culture. In *Halloween*, the male monster punishes sexually active women, a symbolic response to feminist empowerment during the 1970s. By the 1990s, the horror monster had been further emasculated by the growing power of women. *Scream* accordingly mirrors this tension by creating a female 'victim' who fights back against her attacker. This paper uses a socio-historical approach and critical theory to investigate the correspondence between cultural constructions of madness and its representations in the popular Hollywood imaginary.

### **The Gendered Gazes in Disney's *Pocahontas*: John Smith as a Valid Victim of Voyeurism**

Christen M. Stroh (Ishita Sinha Roy), Allegheny College, Department of Communication Arts – Media Studies

From a very early age, children are introduced to the world of Disney, initially through their animated films. A seemingly simple plot of good versus evil, however, often hides other, perhaps more subtle, messages reflecting concepts of sexuality and gender. Traditionally, when Disney is criticized, it is for the manner in which negative female portrayal and objectification remain prevalent in these films. Laura Mulvey's concepts of scopophilia and the male gaze aptly apply to these criticisms from a feminist perspective. However, Mulvey's arguments are often overlooked when arguments involving the objectification of the male body are made. The purpose of this paper is to apply Mulvey's theories of the gaze and scopophilia to Disney films, specifically *Pocahontas*, in a manner that discusses male objectification by both other males as well as females. John Smith, though recognized as a voyeur of *Pocahontas* by many, is not recognized as a victim of voyeurism himself; this paper discusses the manner in which both other male characters in *Pocahontas* and *Pocahontas* herself adopt the principles of scopophilia. *Pocahontas*, especially, utilizes them to objectify John Smith as much as he objectifies her, if not more so.

### **Bridging the Divide for a New Revolution: Case Studies in Chinese Women Organizing**

Rachel Williams (Sharon Wesoky), Allegheny College, Division of Social Sciences – Political Science and Women's Studies

Rural Chinese women are at the brink of what could be a large-scale women's liberation movement. Under the double oppression of poverty and patriarchy, as viewed through a Marxist-Socialist lens, these women are starting to organize. This case study examines the roles of both the All China Women's Federation and the non-governmental organization, Rural Women Knowing All, and ultimately argues that in order for a true, independent women's liberation movement to take place, an alliance must be formed between state and non-state actors. A collective consciousness among all Chinese women is necessary. The All China Women's Federation has been in existence for over fifty years, yet a true revolution in women's roles has yet to occur. As a result, the 1990s until the present have seen women's NGOs forming in response to the continuing issues that the ACWF has failed to address. These two entities in alliance, combined with globalization and China's opening of doors, which will create an "internationalization" of their women's movement, will be the driving forces necessary for the new revolution.

### **ERP Evidence of Interference Across both Visual and Auditory Stroop Tasks**

Holly A. Blasko-Drabik, Joshua W. Rowe, and Andrea L. Pennington (Victoria Kazmerski and Dawn Blasko), Penn State Behrend, School of Humanities and Social Sciences – Psychology

The Stroop effect is often studied as a measure of attentional interference. In the classical Stroop task participants are given three conditions: congruent – the word *blue* in blue ink, incongruent – *blue* in red ink, or neutral – XXXX in blue ink, and asked to identify the color of the text while inhibiting their reading response. In this study we compared the classical Stroop task with an auditory version to determine whether the attention system is modality specific. The auditory task used the word *brass* or *string* which was modified so that it sounded as if a brass or string instrument was saying the word. There were three conditions: congruent – brass instrument saying brass, incongruent – brass instrument saying string, and neutral – only the brass instrument. Participants were asked to inhibit the word and respond only to the instrument. In addition, event-related brain potentials (ERPs) were measured as participants completed the task. Our data showed that the Stroop effect was evident across both tasks; participants took longer to respond and were slower on the incongruent trials than on the neutral or congruent.

### **Stress Levels of College-Aged Students Across Relationship Status**

David D. Daquelente, Danielle A. Lombardo, and Jean M. Roos (Victoria Kazmerski), Penn State Behrend, School of Humanities and Social Sciences – Psychology

Stressors are known to come from being in a monogamous relationship and from being single. For example, single people feel pressure from other individuals to be in a relationship; however, those in relationships not only have to deal with their own stressors but also that of their mates. Relationships are stressful when you are in one or when you wish you were. The goal of this study is to determine if there is a correlation between higher stress levels in college-age individuals in monogamous relationships compared to stress levels in single individuals. It is hypothesized that college students in monogamous relationships will show a relationship with high levels of stress. Stress was measured using The College Undergraduate Stress and the College Student Life Events Scale.

### **Personality Traits and College Adjustment**

Lindsey M. Giuliana, Eldridge J. McNair, and Brian J. Pratt (Victoria Kazmerski), Penn State Behrend, School of Humanities and Social Sciences – Psychology

This study examines relational aggression, social adjustment, and coping strategies in college students at Penn State Behrend. Students from the introductory psychology course, along with students from other psychology courses, volunteered (fifty male and fifty female) for the study. The framework for our study is the Social Information Processing theory. The Social Information Processing Theory is based on the idea of a database that contains stored memories, acquired rules, social schemas and social knowledge. In the database an individual goes through a series of six steps (encoding of cues, interpretation of cues, clarification of goals, response access, response decision, and behavioral enactment) when processing information from social situations. The Revised Self Report of Aggression and Social Behavior was administered to measure relational aggression, the Student Adaptation to College Questionnaire (SACQ) was used to measure the level of adjustment, and the Brief COPE was used to measure the coping strategies of the students surveyed. Our hypothesis is that females will be less socially adjusted because they are more relationally aggressive and have poor coping strategies. A MANCOVA was used in order to determine if the hypothesis was supported.

### **Creating a Safe Social Climate in Our Schools**

Jessica A. Knapp, David D. Daquelente, Danielle A. Lombardo, Ashley M. Ordy, and Jean M. Roos (Charisse Nixon), Penn State Behrend, School of Humanities and Social Sciences – Psychology

The goal of the CASS program, *Creating a Safe Social Climate in Our Schools*, is to make a positive difference in the social norms of the middle school community. This will potentially be accomplished through recognition of hurtful, hidden behaviors of peer aggression. In addition, CASS tries to discover positive normative behaviors for teachers, administration, students, and their parents. The program is based on the Ophelia Projects belief that involvement and instruction should include the community as a whole in order to have lasting effects. The purpose of the study is to evaluate how successful the peer aggression program that began last year with four pilot schools is. In addition to the four pilot schools included in the program last year, new schools have joined the study. The focus of this group for the 2003-2004 school years is Thomas Jefferson Middle School, in Indiana. This school is new to the CASS project. Through this study, we hope to find that CASS has positively impacted the school climates and has been successful in recognizing and reducing hurtful, hidden behaviors in these schools.

### **Evaluation of the CASS Program Pretest Survey at Southwestern Middle School**

Sarah Lawson, Melissa Donnelly, Jessica Sevinsky, and Joanna Obert (Charisse Nixon), Penn State Behrend, School of Humanities and Social Sciences – Psychology

CASS is an acronym for *Creating a Safe Social Climate in Our Schools*. It is a multifaceted training program that brings staff, parents and high school students together to change social norms in the middle school community by recognizing hurtful, covert behaviors of peer aggression. Sixth graders at Southwestern Middle School were given the CASS survey in fall 2002, spring 2003, and fall 2003. The survey measured students' normative and general beliefs about aggression, occurrences of aggression and victimization, school connectedness, peer affiliation, and dominance. We hypothesized that beliefs about aggression directly relate to occurrences of aggression. We predicted there are differences in school connectedness, peer affiliation, and dominance between aggressive and nonaggressive and victimized and nonvictimized students. Results showed the more students believe aggression is acceptable, the more likely they are to engage in it. During the first year, students reported more aggression and victimization, because they became more aware of aggressive situations. The relationally aggressive students were also less connected to their school, less affiliated with their peers, and more dominant than nonaggressive students. These results imply that if the CASS program can increase awareness and change students' beliefs about aggression, their aggressive behaviors should decrease.

### **The Sexual Double Standard: Gender and Sexual Experience Influences Judgments of Personality**

Kristen Rzomp, Nicole Orsini, and Nikki Kulas (Dawn Blasko), Penn State Behrend, School of Humanities and Social Sciences – Psychology

Gender stereotypes suggest that men with a large number of sexual partners are viewed more positively than women with the same number of partners. One question is whether this extends to sexual inexperience. This study investigated whether males' and females' sexual experience affected the way they were judged by peers on their personality characteristics. Based on social learning theory we examined the sexual double standard and the frigid virgin stereotype. Participants read an introduction featuring a medical patient with zero, low, or high sexual experience and rated them on the 5-factor personality traits. We hypothesized that there would be differences based on participant gender, patient gender, and sexual experience. The results showed that male participants judged female patients with a large number of sexual partners as more agreeable than males with the same number of partners. Male participants rated female virgins more intellectual than male virgins. Female participants rated female virgins as less extroverted than male virgins. Overall, the results provide insights on the way virgins and people with high sexual experience are viewed.

### **The Effects of Aggressive Music on Self-Reported Aggression**

Jason J. Wheeler and Marvin A. Sanderson (Victoria Kazmerski), Penn State Behrend, School of Humanities and Social Sciences – Psychology

Previous research has suggested that aggressive music leads a person to commit aggressive acts, but the aggressive music has yielded no significant differences when compared to non-aggressive music on behavior. Consequently, the purpose of the present research will be to investigate the presence of any significant differences in aggression levels when aggressive heavy metal music is paired against aggressive rap music and a non-aggressive type of music. Literature suggests that the more aggressive the music, the more likely the individual will be to score higher on an aggression scale. This study presented a between-subjects design in which participants were randomly assigned to one of three groups (aggressive rap, aggressive heavy metal, non-aggressive music) in which they heard two songs of that genre, accompanied with lyrics so the participants could focus on the beat and words alike, prior to completing a self-report questionnaire on aggression. It is anticipated that aggressive rap will promote higher scores on the questionnaire as compared to the aggressive heavy metal and control group, and that the aggressive heavy metal group will score higher than the control group. Through this research, we hope to strengthen the relationship between music and how it can affect a person's behavior.

## **Population Structure and Activity Trends of the Common Snapping Turtle (*Chelydra serpentina serpentina*)**

James M. Busa (Jeanette Schnars), Penn State Behrend, School of Science - Biology

Snapping turtles are a common species located at Presque Isle State Park (PI) and Lake Pleasant (LP). The purpose of this study was to gain a better understanding of the population structure at the two locations through size, sex ratios, and activity trends. Turtles caught in hoop nets were sexed, weighed, measured, tagged, and examined for eggs. A total of eighty-nine turtles were tagged (PI = 52, LP = 37), and nineteen recaptured (PI = 6, LP = 13). These ratios indicate a greater population size at Presque Isle, which would be expected since it offers more resources in its habitat. Curved carapace lengths at Presque Isle were significantly skewed toward larger size classes ( $p \sim 0.008$ ), possibly due to a more carnivorous diet, which was determined in a previous study. Sex ratios were comparable at both locations and slightly skewed toward males (PI – 1♀:1.2♂; LP – 1♀:1.3♂). Activity trends peaked for males from June 8-18, and for females from June 19-30, coinciding with the nesting period. Eggs from predated snapping turtle nests ( $n = 66$ ) were collected while non-predated nests ( $n = 11$ ) were protected for further hatchling studies. This study gave a better understanding of the population structure and activity of the common snapping turtle at both locations.

## **Looking for Trends among Lakes and among Subhabitats: A Descriptive and Comparative Study of the Unionid, Dreissenid, and ‘Other’ Benthos of the Natural Lakes of Northwestern Pennsylvania**

Katrina J. Butkas (Milton Ostrofsky), Allegheny College – Biology

Because we are learning that benthic macroinvertebrates are important to freshwater ecosystem function, it is important that we gain an understanding of what factors shape benthic communities. The goal of this study was to survey the unionid, dreissenid, and ‘other’ (non-unionid, non-dreissenid) benthos of the nine natural lakes of northwestern PA in order to provide a benchmark against which future data can be compared and to find trends related to subhabitat types and/or whole-lake characteristics. Between the two lakes (Edinboro and Sandy) with established zebra mussel (*Dreissena polymorpha*) populations, significant differences were found in the density, biomass, and length-biomass relationships of *D. polymorpha*; these findings correlate to different phosphorus concentrations and water level fluctuations. Live unionid densities were not lower in Sandy and Edinboro than in the other lakes. However, according to published models, dreissenid-induced unionid mortality is probably occurring in Sandy but not Edinboro. Patterns in the richness, density, and taxonomic structure of ‘other’ benthic communities were found in relation to lake and subhabitat type but not zebra mussel presence. These findings warrant further investigation because humans are constantly trying to alter subhabitats/entire lakes through such activities as weed removal, beach creation, and gravel addition.

## **Float Stage Correlation with Embryo Development in Waterfowl**

Ashley Conrad (Lisa Mangel), Penn State Behrend, School of Science – Biology

While many development stages of domestic birds like chickens are well understood, there is a lack of easily accessible information on the embryological development of waterfowl. A record of waterfowl development in a controlled environment could be beneficial in the understanding of waterfowl development in the wild. The purpose of this study was to provide a record of development focusing on the growth rate and float stages of Mallard ducks. The study was performed by incubating Mallard duck eggs at 100.3°F for approximately 24 days. Daily measurements were recorded using the float test conducted by the Pennsylvania Game Commission to assess eggs in the field. The eggs were then opened, measured, recorded, and the different stages of the embryonic development were digitally captured. The preliminary research gives a framework for matching embryo developmental stages with pre-existing float stages. However more trials are needed to support a strong correlation. A correlation between growth rate and float stage could create a systematic way to closely estimate development within the egg while in a natural environmental setting. This study lays the ground work for future experiments.

### **Reproductive Investment in Female Banded Killifish (*Fundulus diaphanus*)**

Yvonne Ewert and Patricia Speares (Edward Phillips), Gannon University, College of Sciences, Engineering, and Health Sciences – Biology

Banded killifish (*Fundulus diaphanus*) are very common in Presque Isle Bay and Lake Erie, and are an important forage species for piscivorous fish and birds. Banded killifish were collected from Presque Isle Bay on July 9, 2003, at a water temperature of 23°C. Fish were preserved in 10% formalin, sexed, aged, and the ovaries removed in the laboratory. Eggs of twenty-eight females were then sorted according to whether or not they contained yolk. Linear regression analysis showed a significant positive relationship between female length and ovary weight, total number of eggs, number of eggs with yolk, and number of eggs without yolk. The mean number of eggs containing yolk was  $208 \pm 17$ , and the mean total number of eggs per female was  $697 \pm 38$ . These results indicate that, as with most fish species, egg production increases with female body size. They also show that banded killifish release their eggs in clutches rather than all at once. Clutch size, based on mean number of yolked eggs appears to be about 200, indicating that approximately three clutches are produced per spawning season.

### **Differential Kinetics of Auxin-Induced Promoter Activation by Indole-3-acetic Acid (IAA), 1-naphthylacetic Acid (NAA), and 2,4-Dichlorophenoxyacetic Acid (2,4-D) and the Role of Auxin Transport in Dark-Grown *Nicotiana plumbaginifolia* Hypocotyls**

Joshua A. Hayden and Jess Blose (Catharina Coenen), Allegheny College – Biology

Auxin, an endogenous plant hormone, induces rapid changes in the expression of auxin-inducible genes, in part through activating auxin-responsive promoters. These auxin-inducible promoters, such as the *GH3* promoter, are known to respond to a variety of auxins, both natural and synthetic. As of yet, a detailed comparison has not been made of the kinetics of promoter activation by various auxins. To study the activation of the auxin-inducible *GH3* promoter in live tissues, we used hypocotyls excised from five-day-old, dark-grown *Nicotiana plumbaginifolia* seedlings transgenic for a *GH3::luc<sup>+</sup>* promoter::reporter gene construct. Luciferase reporter gene assays showed differential dose-responses and time-courses for three different auxins: indole-3-acetic acid (IAA), 1-naphthylacetic acid (NAA), and 2,4-dichlorophenoxyacetic acid (2,4-D). Since these auxins interact differently with the auxin influx- and efflux-carrier proteins, testing will be done using specific inhibitors of auxin influx and efflux to determine if auxin transport explains the observed kinetic differences. The time courses of promoter activation will also be compared to the activation of auxin-induced hypocotyl elongation. Together these results will allow us to assess the relative contributions of cellular auxin-influx and -efflux systems to the regulation of physiologically active auxin concentrations in living tissues.

### **Complementation of Non-Motile Tn4351 in *Flavobacterium johnsoniae***

Emily R. Mausser, Joshua A. Smith, and Christopher C. Smith (David Hunnicutt), Penn State Behrend, School of Science – Biology

The organism *Flavobacterium johnsoniae* moves over surfaces via a mechanism known as gliding motility. This form of movement does not require the use of flagella or other known movement mechanisms. The mechanism(s) underlying movement is not known. The purpose of this study is to gain a better understanding of the mechanism of gliding motility. Mutant strains were generated by transposon mutagenesis and isolated by screening on antibiotic media; this work was done by others in the lab. We then attempted to complement these strains with known gliding motility genes. There are approximately ten known gliding genes. This was done by transferring plasmids containing the known genes into the mutant strains. The three genes focused on in this work were *gldH*, *gldI*, and *gldJ*. The plasmid vector carrying *gldJ* was unscreenable in Tn4351 mutants and needed to be changed. This was done by digesting pMM265, which contains *gldJ*, with the restriction enzymes Kpn1 and Sph1. The 3.1 kb fragment containing *gldJ* was ligated into pCP29 which had been cut with the same enzymes. This new plasmid was then electroporated into the *E. coli* strain S17-1 and mated to Cj101, wild type *Flavobacterium johnsoniae*.

### **The Utilization of the Polymerase Chain Reaction and DNA Sequencing Technology to Compare the mtDNA Gene Order of the *Branta canadensis* and *Branta bernicla***

Joshua C. Snyder, Adam R. Snider, Eddie J. Disantis, Andrew J. Senecal, Craig A. Mackaness, and Byron P. Vaughn, (Durwood Ray and Frederic Brenner), Grove City College, Departments of Biology and Chemistry – Biochemistry and Molecular Biology

Past genomic research, specifically mitochondrial DNA (mtDNA), in migratory birds has been directed towards finding single nucleotide polymorphisms (SNP) within different populations to track migratory pathways. The purpose of this research is to completely sequence each mtDNA genome to compare gene order and derive a phylogenetic relationship between species. Research is carried out by first isolating and purifying mtDNA from liver tissue taken from the *Branta canadensis* (Canadian goose) and *Branta bernicla* (black brant). A traditional polymerase chain reaction is used to amplify the DNA. Next, a cycle sequencing reaction is used in conjunction with an automated DNA sequencer to derive a set of sequences. These sequences are analyzed with DNA software to construct a contiguous sequence. Ultimately the contiguous sequences will be used to compare phylogenetic relationships between species.

### **Identification of a Novel Polymorphism in the Human Mitochondrial Single-Strand DNA Binding Protein in Breast Cancer**

Erika A. Szymanski, Amanda Kohler, Danielle Lovett, and Timothy R. Blosser (Durwood Ray), Grove City College – Biology

The human mitochondrial single-strand DNA binding protein (mtSSBP) is a nuclear gene product involved in mitochondrial DNA replication. mtSSBP guards against errors in replication by protecting the open displacement loop (D-loop) from nuclease attack and nonspecific primase binding. Our laboratory has previously identified a novel pattern of polymorphisms in the promoter region of mtSSBP via amplification of DNA from breast cancer patients. Further analysis by gel electrophoresis resolves PCR products from a single set of primers into three distinct bands: a doublet consisting of the smaller 766 base pair (bp) published sequence, a slightly larger band we found previously to include a 16 bp indel, and the third larger band estimated to exceed the published sequence length by about 55 bp. The purpose of the present study is to isolate and identify this largest singlet. Separation and purification by gel electrophoresis, cloning into *E. coli*, and DNA sequencing are being employed to characterize what appears to be a novel polymorphism. Its incidence in breast cancer patients with elevated mtDNA copy numbers, and its effects on expression of this nuclear mtSSBP gene in these individuals may shed some light on the relationship between mtDNA replication and oncogenesis.

### **Taurine Uptake in Healthy Fibroblasts and Prostate Cancer Cells: An Investigation into Radioprotection**

Pamela C. Wille<sup>1</sup>, LeeAnn Sarnowski<sup>2</sup>, Kelly Horstman<sup>3</sup>, and Emily Bell<sup>3</sup> (Melissa Barranger-Mathys<sup>1</sup>), <sup>1</sup>Mercyhurst College, Department of Chemistry and Biochemistry, <sup>2</sup>Oakwood Laboratories, and <sup>3</sup>Lake Erie College of Osteopathic Medicine – Biochemistry

Taurine is a  $\beta$ -amino acid omnipresent as the most abundant free amino acid in mammalian cells. Increased levels of taurine protect against galactosamine-induced hepatic necrosis. It is thought to have protective functions against cytotoxic compounds and thus is classified as an antioxidant. Protection is thought to be dependent upon concentration, yet high concentrations are toxic. Prior to reaching toxic levels, taurine exhibits a dose-dependent radioprotective effect on cells. Cellular uptake of taurine occurs more rapidly and in greater quantity in cancer cells than in healthy cells. High levels of taurine may cause an increased sensitivity to radiation in cancer cells while the healthy cells retain a lower, radioprotective level. Previous studies on PC-3 cells (prostate cancer) indicate that 55% of a 10 mM dose of taurine is taken up after 90 minutes. Parallel studies have been completed on normal skin fibroblasts for taurine dosage and optimal uptake. Samples were prepared using an ion-exchange column and analyzed using high-performance liquid chromatography and fluorescent spectroscopy.

### **Male American Barn Swallow Incubation: Why Is the Male Sitting on the Nest?**

Nathan Zimmerman (Margaret Voss), Penn State Behrend, School of Science – Biology

The male American barn swallow (*Hirundo rustica*) exhibits unusual behavior during nesting season. Unlike most passerine birds, the male swallow sits on the eggs while the female is not incubating. Male swallows in several locations displayed this behavior over the course of this study. There are several possibilities as to why male swallows appear to incubate eggs. The male swallow may be actively heating eggs, protecting the eggs, or allowing female swallows to spend more time foraging. The nesting swallows were observed directly or with video tape, and the bird's gender and the time a swallow spent on top of the eggs were recorded. Ambient temperature and egg temperature were recorded simultaneously using thermocouple data loggers, allowing for the egg temperature of male and female incubation to be recorded. Comparisons of these data showed that the average egg temperature during female incubation was  $34.74 \pm 0.79^{\circ}\text{C}$  ( $\bar{X} \pm 95\% \text{C.I.}$ ),  $33.12 \pm 1.32^{\circ}\text{C}$  during male incubation, and  $31.13 \pm 0.91^{\circ}\text{C}$  when eggs were allowed to cool unattended. This suggests that the probable function for male swallow incubation is to increase female foraging time.

### **A Mass Spectral Analysis of Wood Volatiles**

Nicole M. Carroll (Timothy Laher and Michael Bucholtz), Gannon University, College of Sciences, Engineering, and Health Sciences – Chemistry

EPA has identified wood burning in fireplaces and woodstoves as an important source of air pollution. In order to evaluate wood volatiles produced during various stages of combustion, a mass spectral analysis of more than twelve common wood volatiles has been made. Analysis of the fragmentation pattern produced has been made. Expected losses of CO, H<sub>2</sub>O as well as the McLafferty rearrangement were common. The mass spectral fragmentation patterns seen may provide insight into the mechanism of combustion.

### **Spectrophotometric Determination of Thiocyanate Levels in Saliva: A Comparative Analysis for Methods of Detection via Cyanoline Blue and Methyl Red**

Raymond L. Everett III (Naod Kebede), Edinboro University of Pennsylvania, School of Science, Management, and Technology – Chemistry

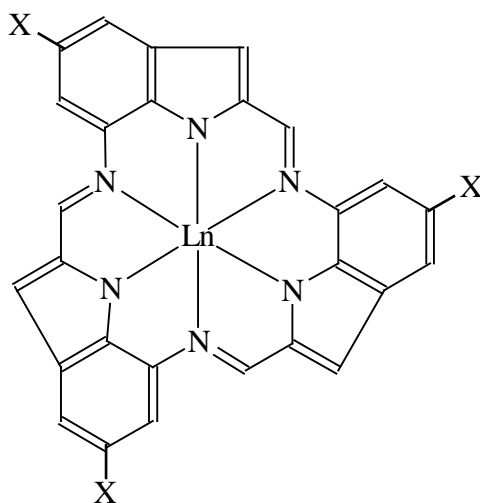
Cigarette smoking and the resulting addiction is an occurrence that can be observed all over the world. In addition to various other health risks, tobacco users exhibit increased levels of cyanide and thiocyanate in their saliva and blood. The central nervous system is the primary target organ for cyanide and thiocyanate toxicity. Neurotoxicity has been observed in humans and animals following ingestion and inhalation of cyanides. Chronic exposure to cyanide through smoking or a saturated industrial environment can lead to several complications and debilitating symptoms of cyanide poisoning. Once in the body, cyanide is typically metabolized to thiocyanate *via* sulfuration with thiosulfate by mitochondrial rhodanese. Determining levels of chronic cyanide exposure then must be done through its metabolite, thiocyanate. Considering the aforementioned information, quantification of salivary thiocyanate is an excellent method for determining whether a person is either chronically or acutely exposed to cyanide. The purpose of this research was to perform two known methods of this quantification, determine strengths and weaknesses inherent in each method, determine the extent of cyanide interference, and suggest procedural improvements and directions in which further research should be oriented.

**Using Molecular Modeling to Predict the Ultraviolet-Visible Spectra of C-40 Hydrocarbon Carotenes**  
Caleb Gerhart (Timothy Laher and Michael Bucholtz), Gannon University, College of Sciences, Engineering, and Health Sciences – Chemistry

The carotenes are a major class of pigments found in plants, microbes, and animals and thus are among the most widespread of natural pigments. They have a role as a secondary light harvester in the photosynthetic apparatus of plants, as a precursor to the formation of vitamin A, as an antioxidant and as a colorant for animals and flowers. The carotenoids are a diverse family, with C-20, C-30, and C-40 molecules common. In addition there are varying degrees of oxygenation and functional complexity distributed through nature. This study focuses on the C-40 hydrocarbon polyenes. The purpose of this study was to use the Spartan molecular modeling software employing the density functional B3LYP method to calculate the ultraviolet/visible spectra maximum and compare to published data. This analysis will provide useful information on determining the structure of new polyenes as well as a better understanding of the role of carotenes as auxiliary pigments in photosynthesis since the Spartan program provides the HOMO – LUMO energy gap.

**Synthesis and Characterization of a Potential Magnetic Resonance Imaging Contrast Agent**  
Christopher M. Kareis (Alan Jircitano), Penn State Behrend, School of Science – Chemistry

The development of MRI techniques as a clinical diagnostic modality has prompted the need for a new class of contrast agents. The agents are administered to patients to enhance the image contrast between normal and diseased tissue. One of the difficulties associated with designing contrast agents is the need to be thermally stable (staying intact until excreted from the body) while allowing for multiple water coordination sites. This work involves the synthesis of such a complex. The ligand can be synthesized through a Schiff-Base self-condensation reaction of three molecules of 7-amino-2-indole carboxaldehyde. The ligand precursor is synthesised in eight steps starting with the Fischer indolization of a nitro-phenylhydrazone to form the nitroindolecarboxylate. The next step involves the reduction of the nitro group to the amine, followed by the addition of a protecting group. The carboxylate group is then reduced to an alcohol, which is then oxidized to the 7-amino-2-indole-carboxaldehyde using the Dess-Martin reagent. Hydrolysis of the protecting group occurs during the template synthesis of the macrocycle by the Lewis acid metal ion. The unsubstituted and methyl derivatives of the alcohol substituted indole have been synthesized and characterized. The synthesis, characterization and progress towards making macrocyclic complexes will be discussed.



X = H, CH<sub>3</sub>, OCH<sub>3</sub>

I

### **Synthesis and Ring Opening of 3-Alkoxy and 3-Amino-2-Isoxazoles**

Elizabeth J. Marton (Martin Kocielek), Penn State Behrend, School of Science – Chemistry

The isoxazole ring has been found to be useful as an intermediate in the synthesis of many biologically active compounds. While numerous methods for ring opening of isoxazoles have been reported, very few exist for the opening of isoxazoles substituted at the 3-position by halogens or heteroatoms. Previous research has shown that treatment of 3-bromo-2-isoxazoles with molybdenum hexacarbonyl will open the ring to yield 2-cyanoketones in moderate to good yields. This research is focused on extending this methodology to isoxazoles with different substituents at the 3-position. In particular, we are investigating the synthesis and ring opening of 3-alkoxy and 3-amino-2-isoxazoles. We have demonstrated that by substituting the 3-bromo-2-isoxazolines with an alkoxy group, and treating the ensuing product with manganese dioxide, the substituted 3-alkoxy-2-isoxazoles can be obtained. The use of molybdenum hexacarbonyl on the 3-alkoxy-2-isoxazoles has been found to open the ring to give 1,3-ketoesters. Further investigation of these novel reactions as well as the analogous reactions of 3-amino-2-isoxazoles will be presented.

### **Identification of the Major Odorants Found in the Peel Oil of *Citrus reticulata* blanco cv. Murcott (Honey Tangerines)**

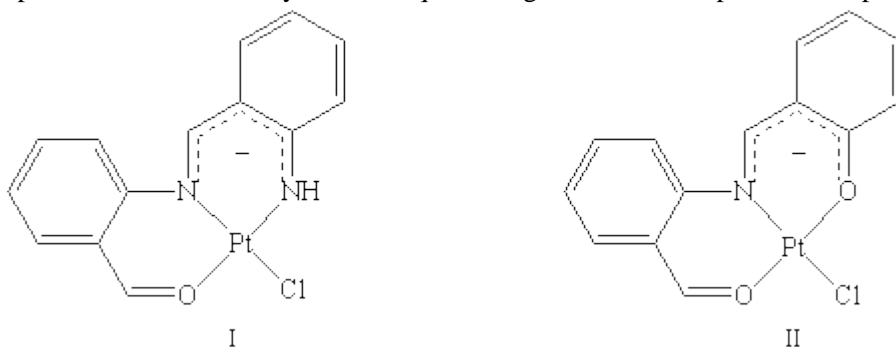
Margaret L. Morrison (Mary Chisholm), Penn State Behrend, School of Science – Chemistry

Honey tangerines and clementines both belong to the *Citrus reticulata* family, but their flavors are very different. Because sense of taste is inextricably linked to sense of smell, uncovering the aroma composition of these mandarin fruits may lead to an understanding of the elusive differences between them. The aroma profile of clementine oil has been previously determined, and the continuing goal of this research is the determination of the complete aroma profile of honey tangerine oil, for eventual comparison between the two. The odorants have been characterized using gas chromatography-olfactometry, and identifications of these odor-active compounds are being made using gas chromatography-mass spectrometry. Some intense odorants found in clementine oil included  $\alpha$ -sinensal,  $\beta$ -sinensal, linalool, and many saturated and unsaturated aldehydes. Preliminary data has identified the major odorants of honey tangerine oil as linalool, citronellal, citronellol, decanal, dodecanal, and additional unsaturated aldehydes, but  $\alpha$ - and  $\beta$ -sinensal have not been detected at the high levels found in clementine oil.

## Synthesis and Investigation of the Photochromic Properties of a Platinum(II) Complex with a Tridentate Schiff-base Condensate

Robert J. Mycka (Alan Jircitano), Penn State Behrend, School of Science – Chemistry

The 2-Aminobenzaldehyde (oab) molecule is an interesting one. It undergoes a variety of self-condensation reactions, depending on the absence or presence of a metal ion. Reaction with aqueous Pt(II) produces a dimeric Schiff-base condensate, [N-(2-aminobenzylidene)anthranilaldehydato-O,N,N']chloroplatinium(II) (Pt(AAA)Cl) (I). The complex is unusual in that it is photochromic in coordinating solvents. In acetonitrile, for example, the solution is orange-red in the dark and purple when exposed to light. The coordinated aldehyde is displaced by the solvent in the dark and reattaches in the light. In this study, an analogous complex was synthesized with a phenolate trans to the coordinating aldehyde. N-(2-hydroxybenzylidene)anthranilaldehyde was synthesized by pyridinium chlorochromate oxidation of the Schiff-base condensate of salicylaldehyde with 2-aminobenzyl alcohol. The dark purple complex, [N-(2-hydroxybenzylidene)anthranilaldehydato-O,N,O']-chloroplatinium(II) (Pt(HAA)Cl) (II), was formed from the direct combination of Pt(II) with the ligand in aqueous base. The structure of analogous complex has been confirmed by means of spectral data; however, various attempts at displacing the coordinated aldehyde have proven unsuccessful. This reveals that the bonds of the phenolate and the aldehyde are of equal strength, thus the compound is not photochromic.



## Synthesis of a Novel Photochromic Pt(II) Complex from 2-Amino-4-Phenylbenzaldehyde

William T. Parker (Alan Jircitano), Penn State Behrend, School of Science – Chemistry

In the presence of  $\text{Pt}^{2+}$ , *o*-aminobenzaldehyde will undergo a Schiff-base self-condensation reaction around the  $\text{Pt}^{2+}$  to form Pt(AAA)Cl (I). The oxygen-platinum bond that is formed is weak, and when the Pt(AAA)Cl is in acetonitrile solution, in the dark, the O-Pt bond breaks and acetonitrile coordinates to the  $\text{Pt}^{2+}$ . The solution changes color from purple to red-orange. Using different derivatives of *o*-aminobenzaldehyde, various platinum complexes have been synthesized, including Pt(Cl-AAA)Cl, Pt(F-AAA)Cl, and Pt(CH<sub>3</sub>-AAA)Cl, with the substituent located at the 4- (para to the aldehyde) and the 5- (para to the amine) positions. Each of these complexes are photochromic and undergo the color change described at a rate dependent on the substituent and its position. This current research involves the synthesis of Pt(C<sub>6</sub>H<sub>5</sub>-AAA)Cl in 7 steps from 4-phenyl-2-aminobenzaldehyde, with the phenyl group at the 4- position (II). The synthesis and the kinetics of the complex will be described.

## **Determining the Compositions of Alpha Cyclodextrin- $I_3^-$ Host-Guest Complexes by Potentiometric Titration Method**

Sara B. Rosenberger and Brandis L. Teats (Arshad Khan), Penn State DuBois – Chemistry

Alpha cyclodextrin (A-CD) represents a cyclic compound of six glucose molecules,  $(C_6H_{10}O_5)_6$ , that can enclose a variety of substances like drugs, cholesterol, etc., in its cavity. It has potential applications as a carrier of medicine which is expected to release the medicine gradually at the body temperature. The earlier UV-Visible spectroscopic study on aqueous solutions of A-CD and  $I_3^-$  suggests that a complex of composition  $(A-CD)_2I_3^-$  (2:1 complex) forms in the solution. The present study involves a more sensitive potentiometric method and shows that a series of complexes forms at lower temperatures with 1:1 to 6:1 compositions of A-CD:  $I_3^-$ . Possible structures of these new complexes are postulated and their stabilities are examined by raising the temperature of the experiment.

## **Characterization of Intermediates Related to Silicon Nitride Using Matrix-Isolation Spectroscopy**

Roy Schleicher (Jay Amicangelo), Penn State Behrend, School of Science – Chemistry

Matrix-isolation infrared spectroscopy is used to characterize short-lived reaction intermediates related to the chemical vapor deposition of silicon nitride thin films ( $Si_3N_4$ ). The experiments performed involve the passage of mixtures of silane ( $SiH_4$ ) with ammonia ( $NH_3$ ) and silane with nitrogen ( $N_2$ ) through a microwave plasma discharge source. The products of these reactions are trapped in solid argon at 10 Kelvin and their infrared spectra obtained. The identification and characterization of the species generated is established by performing experiments with isotopic reagents ( $SiD_4$ ,  $ND_3$ ,  $^{15}NH_3$ ,  $^{15}ND_3$ ,  $^{15}N_2$ ), by matrix annealing experiments (warming and refreezing), by matrix photolysis experiments (mercury arc lamp), and by performing theoretical calculations (Gaussian 98).

## **Tandem Ring-Opening/Aldol Condensation of 2-Bromo-Isoxazoles**

Jolene V. Schuster (Martin Kociolek), Penn State Behrend, School of Science – Chemistry

Isoxazoles and isoxazolines have been shown to be useful intermediates in the synthesis of a number of natural products. In addition, some of their derivatives have been found to have antibacterial activity. Consequently, new methods for the synthesis and ring opening of isoxazoles and isoxazolines are highly desirable. While a number of ring-opening methods are known, very little research has been directed toward coupling these ring-opening reactions with other transformations. It has been previously demonstrated that 3-bromo-2-isoxazoles can be ring opened to give 2-cyanoketones. These cyanoketones have been shown to readily undergo intramolecular condensation with a variety of carbonyl functional groups. Our research is focused on the tandem ring-opening/aldol reactions of carbonyl-containing 3-bromo-2-isoxazoles. This work directed towards the synthesis of both aliphatic and benzo-fused cyclic enones will be presented.

## **Ring Opening of 3-Bromo-2-Isoxazoles**

Nicholas G. Straub (Martin Kociolek), Penn State Behrend, School of Science – Chemistry

Isoxazoles have been proven to be useful reaction intermediates in the synthesis of natural products and compounds that have unique antibacterial activity. There are currently numerous ring-opening methods, but none of the documented methods have been shown to give 2-cyanoketones as products. Our research is focused on investigating and developing novel isoxazole ring-opening methods that will yield these useful synthetic intermediates. The use of molybdenum hexacarbonyl in refluxing acetonitrile/water has been shown to promote ring-opening of 3-bromo-2-isoxazoles to give 2-cyanoketones. This method has been applied to a number of substituted 3-bromo-2-isoxazole analogues in order to establish the generality of the reaction. The scope and usefulness of this novel method will be reported on.

### **Computational Study of Hydrogen Chemisorption to Single-Walled Carbon Nanotubes as a Function of Tube Size, Geometry, and Hydrogen Coverage**

Jonathan J. Vadnal and Lukasz Karapuda (Ronald Brown), Mercyhurst College – Chemistry

Single-walled carbon nanotubes have recently been shown to possess the potential to adsorb significant amounts of hydrogen. Although physisorption has been considered in past studies, chemisorption may be necessary to achieve levels of hydrogen adsorption necessary for fuel cell applicability. This project involved a computational study of the hydrogen adsorption process using cross-sectional models for carbon nanotubes. The chemisorption energies were calculated as a function of tube geometry. These calculations were performed using DFT and configuration interaction calculations with the Gaussian03 software package. The effects of hydrogen saturation and deformation of the nanotube upon chemisorption energetics were considered. In addition, chemisorption to localized sites modeling the ends of the tubes was studied. The results include the effects of tube size, geometry, and hydrogen coverage upon adsorption.

### **Effect of Electrical Current Flow in Machining Operations**

Christopher D. Agosti (John Roth), Penn State Behrend, School of Engineering and Engineering Technology – Mechanical Engineering

Forces are required to remove material from a workpiece. The forces necessary to machine hard materials are often high and make machining these materials difficult. It is believed that electrical current may aid in reducing the forces necessary to machine these types of materials. Literature has been obtained supporting the effect of electricity on the mechanical properties of a material. The intent of this research was to determine the feasibility of electrically assisted machining and to attempt to determine if the cutting forces could be reduced by machining a workpiece that is conducting an electrical current. Fixtures were designed to insulate both the cutting tool and machine tool from the charged workpiece during machining. Spark tests were performed to assist in selecting an appropriate insulating material that also had the strength properties necessary to secure the workpiece. Safety devices were designed to reduce the hazard to personnel and equipment. Force data were collected for the intended machining operation without current to establish a baseline. From this research, it was determined that electrical machining is a feasible operation and may be performed safely. However, the attainment of force data for the machining of a material while conducting electricity is still pending.

### **Multiple Sensor Integration for Predicting Tool Wear**

Kevin Fisher (John Roth), Penn State Behrend, School of Engineering – Mechanical Engineering

It has been proven that accelerometers and force dynamometers can predict the imminent failure of a cutting tool. One of the problems with the current computational technique is that both types of sensors have poor signal-to-noise ratios, which makes the model very complicated. The desired signal needs to be extracted from the background noise, which results in a very weak signal. This research will try to integrate the signals from both the acceleration and force sensors. Because their respective noise is different, this should boost the signal in the machining frequencies and improve the signal-to-noise ratio. This type of integration between accelerations and forces in machining has never been researched before. It may also provide insight into the relationships between forces and accelerations in machining that may help other research in this field.

### **Floppy Disk Drive Protocols**

Scott M. Hrinko (Thomas Hemminger), Penn State Behrend, School of Engineering and Engineering Technology – Computer Engineering

Very little information is available on the protocols used to communicate directly with floppy disk drives. Much of the widely available information focuses on controlling a drive with a controller card and chipset, which act as an intermediate between the computer and drive. In smaller projects, where only around 1 MB of removable storage is needed and a complex DOS or Linux format is not required, a controller chip may be unnecessary and a small microcontroller or similar device may be sufficient. This project examined floppy disk drive standards/protocols used to communicate directly with the drive. It required integration and compilation of materials from a variety of sources, e.g., technical manuals, Internet sites, and textbooks in order to develop a brief manuscript detailing how to interface a floppy drive without the need for a specific controller card. The result is a technical document providing the information necessary to program a microcontroller or similar device so that a computer can communicate with and store/read data in a basic format. One application of this work is for interfacing relatively small systems with floppy drives without the need for dedicated controller cards with established ISA or PCI connectors.

### **Electronically Controlling the Rolling Motion of a Ball on a Tilting Surface**

James Jukkola (Ronald Krahe), Penn State Behrend, School of Engineering and Engineering Technology – Electrical Engineering Technology

Historically, many experiments have been performed to analyze rolling objects on an inclined plane, but few, if any, have varied the inclination angle as a function of time while the objects are rolling. The purpose of this research project was to investigate electronic control methods to move a ball a specified distance across a flat surface. Only the force of gravity may be used to move the ball, and the ball must begin and end at rest. The proposed method was to tilt the surface forward to start the ball rolling, and then tilt the surface back to slow and stop the ball at the desired location. A working mathematical model has been developed using the physical principles of rolling motion, and the model has been analyzed using Maple. A test mechanism is currently being built, using a microprocessor-based motor control system to control the tilting surface. The theoretical results will be verified experimentally when the mechanism has been completed.

### **802.11b Wireless LAN Data Transmission/Reception**

Jeffrey Kirsch and Michael Porter (David Loker), Penn State Behrend, School of Engineering and Engineering Technology – Electrical Engineering Technology

The focus of this research project is to study how the 802.11b wireless communication standard operates and how it can be utilized for transmitting live video from a remote rover and sending control data back to the rover. The 802.11b hardware being used for this project is an Airborne 802.11b Wireless LAN Module and an Airborne Direct Ethernet to Wireless LAN Bridge. The other peripheral hardware components involved are an Atmel 8051 Microcontroller, QM4088 B/W camera with digital output, and an old remote control car assembly. The desired result of this project is to develop a rover which can be controlled from a remote PC, where the operator is receiving a video signal from the rover. An additional result of this project would be a better understanding of this communication standard for the students and faculty member involved.

### **Steering for an Electric Vehicle**

Shawn R. Kozen (Ronald Krahe), Penn State Behrend, School of Science Engineering and Engineering Technology – Electrical Engineering Technology

We have researched a method of controlling a steering motor by means of a joystick and microcontroller. We created a model for the physical parameters of the system, and investigated various control schemes. We chose a control scheme to optimize ease of use, creating a natural, user-friendly interface. We designed a feedback control system mathematical model, and we are in the process of implementing the control system on a microcontroller with limited processing speed and memory. The model system will be tested and the results compared to the theoretical predictions.

### **Automation and Optimization of Fluid Flow Simulation for Spinnaker Aerodynamics**

Amy J. McCullough (William Lasher), Penn State Behrend, School of Engineering and Engineering Technology – Mechanical Engineering

A spinnaker is a sail used in racing yachts when the boat is in a downwind sailing situation. In order to understand spinnaker aerodynamics better, twelve sails were previously tested in a wind tunnel at varying angles of attack, and force coefficients for each model were measured. A shape identical to one of these spinnaker models was imported into Gambit (a mesh generation program) and a volume representative of the wind tunnel was created surrounding the model. This volume was then meshed and imported into Fluent, a Computational Fluid Dynamics (CFD) program. In order to reduce the time spent preparing the spinnaker model for simulation in Fluent, a command file was created that automates this process and begins the simulation in Fluent. This allows for efficient testing to determine the optimum mesh density, convergence criteria, and other solver options. Different parameters were tested in order to determine what values were needed to obtain accurate results using the least amount of computation time. Both of these objectives resulted in a more effective simulation process. Data can be generated much more easily and efficiently. This will allow for rapid analysis of sail designs beyond the original twelve.

### **The Use of Using EFID to Sense Objects without Contact**

Ted J. Yowonske (David Loker), Penn State Behrend, School of Engineering and Engineering Technology – Electrical Engineering Technology

Recent technology from Motorola has given the ability to use low-frequency signals to analyze the presence of an object. Though this is not a revolutionary design, it has made this type of sensing more feasible and cost-efficient than other types. The device is a MC33794 electric field imaging device. This device has the capabilities to produce a low-frequency waveform on nine different outputs. The outputs are then monitored for a change in the waveform. Once a change is detected, the information is used to establish that an object has been encountered in that outputs vicinity. This information is very valuable because in the past an object would have to come in contact to establish its presence. There are other means to do the same procedure, such as ultrasonic waves or infrared break beam detection, but these means have drawbacks as well. The MC33794 is a stand-alone device, unlike others which have multiple parts and accessories to make them work. The MC33794 for demonstration will be used in conjunction with a microcontroller to manipulate the data given into a visible, user-friendly form. It will basically sense where a person's finger is and give a visual or written representation of it back to them.

### **High School Students and Credit Cards: Consumer Socialization and Financial Awareness**

Angela Fetzner (Diane Parente and Mary Beth Pinto), Penn State Behrend, Sam and Irene Black School of Business – Finance

There have been a number of studies concerning college students and credit cards, many at Penn State Behrend. These studies primarily focused on the average college student. However, little effort has focused on how high school students or incoming freshman students differ from those already acclimated to the college experience. In this study I investigated the relationship between financial knowledge and credit card usage and credit card exposure. I will specifically look for correlations between outstanding balances and financial knowledge between the college students and the incoming freshmen. I will also investigate differences between the two groups in credit card exposure.

### **Context and Semantic Similarity Influences On-line Processing of Metaphors**

Chrissy Anderson, Dotty Shaffer, and Matthew Stevenson (Dawn Blasko and Victoria Kazmerski), Penn State Behrend, School of Humanities and Social Sciences – Psychology

Two experiments examined the on-line and off-line influence of similarity, aptness, and context on the comprehension of metaphors. In addition we investigated whether readers high or low in working memory differed in their processing. We explored the influence of similarity and context on comprehension, and examined how these characteristics of a metaphorical utterance interact with working memory. Previous research has shown that individual differences in working memory capacity constrain language understanding. In Experiment 1, the results showed that topic/vehicle similarity interacted with context. Working memory did not influence meaningfulness judgments. However, those with lower working memory required more time to judge the metaphor meaningful. This effect was not seen in the reading times. This suggests that working memory capacity was not exceeded because the participants could look back at the sentence. In Experiment 2, we used a more difficult moving window reading task that would be expected to tax working memory. We predicted that those with lower working memory capacity might require more contextual support for the difficult metaphors, especially when they were unable to look back. We expected to see the largest effect on the last word where sentence wrap up would likely occur.

### **Potential Protective Factors for Relational Aggression: Future Time Perspective, Activity Involvement, and Normative Beliefs**

Shannon Bach and Kristin Hesch (Dawn Blasko), Penn State Behrend, School of Humanities and Social Sciences – Psychology

The current study evaluated the relationship between future time perspective, activity involvement, normative beliefs, and relational aggression. Students in eighth grade from Harbor Creek Junior/Senior High School were compared with college students from Penn State Behrend. All participants were given a survey measuring their past, present, and future time perspectives, participation in school and outside activities, and beliefs about aggression, as well as a self-report measure that evaluated their involvement in relationally aggressive behavior. Results showed that students' normative beliefs about aggression were related to self-reported relational aggression. Those with high future time perspective were less likely to score high on relational aggression, and those with a higher present time perspective felt that aggression was more justified.

### **Self-Esteem and Its Relationship to Body Mass Index and Adult Attachment Style**

Jennifer Braithwaite, Elma Dorić, and Lauren Sanko (Victoria Kazmerski), Penn State Behrend, School of Humanities and Social Sciences – Psychology

Previous research has compared self-esteem to adult attachment styles, and self-esteem to body mass index (BMI). Many studies have shown attachment style is a predictor of self-esteem. The research done on BMI and self-esteem, however, remains unclear, pointing to a possible indirect relationship between them. This study focuses on bridging the gap in research between attachment and BMI to find a directional relationship that all three variables share. This is important in predicting potential emotional and psychological problems that individuals may develop. Participants completed three surveys: Multidimensional Self-Esteem Inventory (MSEI), Experiences in Close Relationships-Revised (ECR-R), and a demographic survey from which we will obtain the BMI information. We hypothesized that higher BMI and higher dimensions of avoidance and anxiety in attachment will predict lower self-esteem. Furthermore, we predicted that there is a direct relationship between BMI and attachment.

### **The Further You Are, the More You Recall**

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Lack of personal space has been problematic across many schools nationwide, thus yielding a negative effect on a student's cognitive ability to recall information. In this study, fifty undergraduate students were recruited through a campus research pool, in which personal space was manipulated by varying seating arrangements (crowded or uncrowded). After each seating manipulation, a National Geographic movie on an ancient culture was shown and an open-ended test was administered to assess the dependent variable, recall abilities. It was hypothesized that recall performance was better with uncrowded-personal space. Since previous studies have revealed that females have a tendency to freeze in smaller spatial situations but reveal better conformity than males, it was then inferred that male students would demonstrate a greater recall difference in crowded conditions. Nevertheless, by crowding personal space, or providing a seating arrangement that does not complement the personal space preferences of a participant, reactions could be altered, which may affect the mental capacities in an academic setting.

### **Creating a Safe School Environment**

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Recent research has indicated that many schools today are facing an increase in aggressive behavior. The purpose of this project is to evaluate students, mentors, faculty, and parents for the signs of aggressive behavior and how to respond under aggressive conditions. It is hoped that this project will contribute to the creation of a safer school environment, and that other schools and the community will adopt the program. As of now, we are receiving quantitative feedback from surveys and qualitative feedback from holding focus groups from various schools across the United States. With the use of surveys we are obtaining the current aggression status of each school in numerical form, and by holding focus groups we are learning about the effectiveness of the project and how to improve the program. However, due to the novelty of the project, further research is recommended.

### **CASS: Creating a Safe School in Notre Dame Academy**

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Creating a Safe Social Climate in Our Schools (CASS) was created by the Ophelia Project to address the problem of relational aggression in our schools. Relational aggression includes all behavior that intends to harm one's relationships with his or her peers or injure one's feelings of social acceptance. The purpose of this study was to evaluate the success of the Ophelia Project's CASS program in Staten Island's Notre Dame Academy. One hundred and fifty students in grades four-seven were surveyed throughout the 2003-2004 school year. The surveys consisted of questions related to aggression. Variables in this study included relational aggression (RA), physical aggression (PA), and verbal aggression (VA). Through these surveys we were able to distinguish general beliefs related to aggression. The surveys also helped determine the locations and situations where aggression was occurring. Through focus groups conducted at Notre Dame Academy student and teachers informed us of the program's strengths and weaknesses. It is believed that if the CASS' program can change the beliefs of the students, parents, and teachers, then the outcome will reveal positive adjustments in their behavior. It is anticipated that through community intervention it will positively impact the social norms in a middle school community.

### **Evaluation of Scientific Inquiry Learning in Fourth Grade**

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Does inquiry-based learning provide students with more meaningful experiences than the traditional text-based method? In this study fourth graders were given a test covering factual content and an application of the process of scientific investigation after they finished a science unit using the hands-on, guided-inquiry method. They were reassessed two months later. This process was repeated after they finished a science chapter using the traditional text-based method. These grades were recorded. The group means were then compared to see whether students scored higher on tests for units that were taught with hands-on or text-based methods. The mean scores were lower on the reassessment than the original tests using both methods. Results did not support our hypothesis that hands-on teaching creates longer memory retention than traditional text-based methods. However a positive outcome is that it appears that the children are able to transfer the process of inquiry even to concepts where they have not used inquiry. The students in this study had all been using research-based methods of learning science for the previous year and the previous unit.

### **Gender Partner Preferences and the Type of Heterosexual Dating Relationships**

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Research suggests that men are inclined to judge women based on physical attractiveness, but place less importance on this for a short-term relationship. Whereas, women tend to emphasize non-physical characteristics in their evaluation of men and place equal emphasis on physical characteristics for both short and long-term relationships. This study further assessed the characteristics that are important in dating preferences of heterosexual males and females. Our particular focus was to examine how physical and non-physical characteristics affect men's and women's views when selecting a dating partner and type of relationship (short- or long-term). To determine the participant's ratings of attractiveness, media images and characteristics will be used. The participants will also be asked to rate the images on how likely he or she would be likely to date the person in terms of a short and long-term relationship. A questionnaire including demographic information, ratings on non-physical characteristics, and information on the length of relationships will also be administered. It is hypothesized that there will be a significant difference between male and female dating preferences. Future implications include education concerning the effect that these images have upon viewers and how these images affect the choices of dating relationships.

### **Psychological Closeness to Family Influences College Student Adjustment**

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When first-year college students move away from home they may experience anxiety due to the fact that they are away from home for the first time. This anxiety may be reduced by communication between students and their parents. Psychological closeness is an estimate of the theoretical space between a student and his or her parents. We defined psychological closeness as the frequency with which students contact family members. These types of communication include cell phones, e-mail, letter writing, and other current technologies. Physical distance was defined as the distance in miles from the family home to the student's residence at school. We hypothesized that participants with more psychological closeness to their families would have higher adjustment to college. We also hypothesized that physical distance would show a positive correlation with adjustment. We found that psychological closeness impacted several types of college student adjustment, whereas physical distance had a correlation only with social adjustment.

### **The Influence of Experimenter Gender and Appearance Evaluation on Self-Esteem**

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The purpose of this study was to determine whether self-esteem would increase if participants received a compliment (that they are attractive) from a person of the opposite sex. Participants were brought into the lab, their picture was taken and they were told that the pictures would be rated for attractiveness. Half were told that they were attractive and half were told that they were average. Based on recent findings in experimenter expectancy and the social learning theory, there should be significant interactions between the participants and the experimenter that can be measured using the MSEI, the Multi-Dimensional Self-Esteem Inventory. Our independent variables were gender of experimenter, the attractiveness rating, and gender of the participants. Our hypothesis was that those participants who were given an attractiveness rating by an experimenter of the opposite gender will score significantly higher than those given the average rating by an experimenter of the same gender. Our results showed several significant interactions between the three independent variables.

### **Depression and Grief: Differences in Bereavement at Five Weeks and Nine Weeks**

Megan E. Horanic and Jennifer L. Hornaman (Victoria Kazmerski), Penn State Behrend, School of Humanities and Social Sciences – Psychology

Research has shown that there are differences in bereavement symptomatology as time passes, and these differences are usually measured at three months intervals for the first eighteen months. The purpose of this study was to look more specifically at the bereavement process during the first three months, and to examine demographic variables, such as age, race/ethnicity, gender, and education level, that have not been examined before. The design of this study is a mixed design. We compared the participants' scores on the Texas Revised Inventory of Grief and the Center for Epidemiological Studies Depression Scale at two different time periods. Then we compared these scores with regard to demographic variables. This study is also unique because it only included spouses and first-degree relatives. These participants were recruited through the Hospice of Metropolitan Erie, and they were tested twice at a four-week interval. The anticipated results are that people's grief and depression levels will decline as time passes since the death of their loved one, and that there will be differences in the bereavement progression according to demographic variables. These expected results would follow along with the phase model of bereavement, which states that most individuals experience the same symptoms, but sometimes at different rates and severities.

### **Context Dependent Memory: The Effects of Seating on Recall and Recognition**

Lisa Jacobs and Erin Troester (Victoria Kazmerski), Penn State Behrend, School of Humanities and Social Sciences – Psychology

This experiment examined the effects of environmental context dependent memory on a test of memory recall and recognition. Studies conducted have found that memory for material is better when it is recalled in a context similar to the one in which it was learned. The type of chair the participant sits in to learn the material is hypothesized to have an effect on the test results for that participant. If the test was taken in the same chair in which the participant studied, performance was better than if the type of chair the participant used was changed between the learning and testing phases; i.e. participants in matching conditions performed better than those in mismatching conditions. The two types of chairs that were used in this experiment were a bean bag chair and a desk chair. Each participant was given an original short story to read and study during the learning phase, the interim phase consisted of a demographic survey and a game of Boggle, followed by a test of twenty questions, ten which tested recall and ten which tested recognition, during the testing phase.

### **Spirituality, Religiosity, and Personality Predict Normative Beliefs about Aggression**

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In the Social Information Processing Model the database is the collection of beliefs, schema, and other subconscious characteristics that affect behavior. We investigated the degree to which spirituality, religiosity, and personality would predict normative beliefs about aggression in college students (N=190). Four scales were administered to assess these variables; Expressions of Spirituality Inventory, Intrinsic/Extrinsic Religiosity, the Five-Factor Mini-Marker of Personality and the Normative Beliefs about Aggression measure. Results showed that the less Agreeable, Conscientious, Religious, Cognitively Oriented Towards Spirituality and Intrinsically Religious the participants were, the more likely they would be to accept aggressive beliefs. Spirituality and religiosity have an effect on normative beliefs about aggression beyond what is predicted by personality alone, therefore they are important to include in future studies of aggression.

### **Have the Times Changed? Development of an Implicit Measure of Attitudes Towards Women**

Vanessa Marte and Tammy Sudul (Dawn Blasko), Penn State Behrend, School of Humanities and Social Sciences – Psychology

Society's attitudes towards women have become more and more positive throughout the years; however the sexes are far from equality. Because our attitudes and beliefs affect everything we do and say, we found it necessary to measure how people today view women in society. First, we measured people's beliefs about women with the Attitudes Toward Women Scale, and because society would not be accepting of negative attitudes towards women, we developed a computer task that was used to see if what the individual answered on paper is what that person's subconscious really believes. In this task participants are shown male and female faces paired with positive and negative words. We hypothesized that people who have more negative attitudes towards women on the Attitudes Toward Women Scale may also show more facilitation to negative words when preceded by a woman's face. The current results did not show a relationship between the implicit and explicit tasks. We found that people who are more positive towards women also have more negative attitudes towards men.

### **Gender, Restrained Eating, and Nutritional Labeling are Greater Influences on the Selection of Regular and Low Fat Italian Dressing than Genetics**

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This study explores taste sensitivity to 6-n-propylthiouracil (PROP), gender, eating habits, and nutritional labeling and how these variables influence preferences for and selection of regular and low fat Italian dressing. Individuals were tested for PROP taster status and divided into supertasters, tasters and non-tasters. Participants rated the pleasantness and fat content of the high and low fat dressings. They were randomly assigned to a labeled or non-labeled dressing group and chose one of the dressings to eat on a salad. We predicted that because nontasters have less taste sensitivity, they would be more influenced by food labels. We expected supertasters to be more sensitive to fat content in salad dressing and, therefore, to prefer the low fat dressing. The results showed that gender, nutritional labeling, and restrained eating influenced what participants chose to eat. Females and restrained eaters were more likely to choose the low fat dressing. The ability to taste PROP interacted with gender to influence restrained eating habits, but had no influence on actual dressing selection or preference.

## **Commerical Content and the Societal Appearance Ideal: Appearance-Related Thoughts in Male and Female Undergraduate Students**

Dotty S. Shaffer and April R. Hartman (Dawn Blasko), Penn State Behrend, School of Humanities and Social Sciences – Psychology

Society is bombarded daily by hundreds of television commercial messages. What effect might these messages have on societal beliefs? Previous research has shown that the images displayed by the media serve as an appearance standard or an “ideal.” Often this ideal is unrealistic, creating an impossible standard. Previous research has shown that the internalization of these ideals may be linked to the occurrence of eating disorders. However, not everyone exposed to these messages develops an eating disturbance. In the present study, we set out to determine the possible cognitive factors that explain this differential development. Specifically, we proposed to link the occurrence of appearance-related thoughts with the internalization of societal ideals. Participants were first tested on their level of societal ideal internalization. High and low internalization groups were formed by calling back those scoring in the extreme twenty-fifth percentages. Groups were then randomly assigned to view appearance-related commercials or commercials of neutral content. Afterward, all participants were tested on the existence of appearance-related thoughts. The results showed that females scored significantly higher than males on the measure of societal ideal internalization. However, there were no effects of video exposure or internalization.

## **Mean People, Mean Brains: The Link between Relational Aggression and Sarcasm**

Kristen Shaffer (Dawn Blasko and Victoria Kazmerski), Penn State Behrend, School of Humanities and Social Sciences – Psychology

The intent of relational aggression is to damage someone’s interpersonal relationships, and this is often accomplished via sarcasm. The current study is the first to investigate whether there is a connection between relational aggression and how sarcasm is processed in the brain. Event-related potentials (ERPs) are scalp-based electrical potentials. When time-locked to a position in a sentence, they can provide information about the moment-by-moment processing of a sentence as well as about the brain regions involved. Participants high or low in self-reported relational aggression were tested by recording ERPs from sixty-four channels. Participants read biasing paragraphs that were sarcastic, literal, emotionally positive, or emotionally negative followed by a target utterance, e.g., “You really are a good driver.” In the sarcastic context the driver had just caused an accident and in the literal he had just avoided one. The difference between literal and sarcastic statements emerged 600 ms after the presentation of the final word and that this effect was broadly distributed across the scalp. Amplitudes and scalp topography varied between the high and low groups, suggesting that personality factors play an important role in the interpretation of figurative language.

## **An Evaluation of the CASS Project at St. Mary’s Episcopal Day School in Tampa, Florida**

Jennifer Stanford and Kelly Miller (Charisse Nixon), Penn State Behrend, School of Humanities and Social Sciences – Psychology

Although many past studies have focused primarily on forms of aggression: relational, physical, and verbal; comparatively little research has been done specifically focusing on the social climate of the student. Creating a Safe Social Climate in Our Schools or (CASS) is a program designed by The Ophelia Project to promote a safe environment where emotional, physical, and social needs are nurtured. This study evaluated the first year program at St. Mary’s Episcopal Day School in Tampa, Florida. Both qualitative and quantitative data were collected and examined in this study in the form of surveys and focus groups from grades five through eight. Results indicate that both girls and boys participate in relationally aggressive behaviors. However, a small percentage of girls reported being the aggressors, while a high percentage reported being victimized. Additionally, high percentages of both sexes reported that they were very hopeful something could be done to reduce relational aggression in their school. Implications from this study suggest the continuation of the longitudinal study in an effort to examine the ongoing changes within St. Mary’s social climate in comparison with the existing national data set.

## **Does Rotation Strategy Influence Gender Differences in Mental Rotation**

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Previous research has found that males tend to score higher on tasks involving mental rotation than females. There are at least two strategies for completing mental rotation; the viewer can imagine rotating around a display of objects or the viewer can imagine the object rotating. In previous research, gender differences are reduced when participants use viewer rotation as opposed to object rotation. In the current study we attempted to develop a computer-based version of this task that can potentially be placed on the Web. In the current study, all participants memorized a display of four objects in four locations. They were then asked to mentally rotate the objects or the display 0, 90, 180, or 270 degrees and answer questions about the position of the objects in the display. We hypothesized that viewer rotation would be faster and more accurate for both males and females than object rotation. In addition males and females should differ in object but not viewer rotation. If the results of the study are promising, the tasks will become a new module for VIZ, The Visualization assessment and training Web site.