

**CELEBRATION
OF STUDENT RESEARCH
AND CREATIVE ACTIVITY**

**XAVIER UNIVERSITY
APRIL 21, 2008**

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POSTER PRESENTATIONS

1. ROLE OF L- AND T-TYPE Ca^{2+} CHANNELS IN BOVINE CORONARY ARTERY CONTRACTION

Jackie Baker, Nilay Choksi, Charles Gabis, Nicholas Jabre, Quyen Nguyen, Emmanuel Ofori, Anthony Parr, Jackie Stenger, Amanda Snyder, Katherine von Brecht (Dr. Lisa Close-Jacob)

Department of Biology

L-type and T-type Ca^{2+} channels mediate contractions in smooth muscle. Studies have shown that hypoxia inhibits L-type Ca^{2+} channels, causing relaxation. We investigated the role of these channels in force maintenance under normoxic and hypoxic conditions. We also explored the role of L-type Ca^{2+} -channels in oscillatory behavior during sustained contraction. Bovine LAD coronary arteries were isolated and contracted with $5 \times 10^{-8} \text{M}$ U46619 to elicit an initial contraction. Tissues were then separately subjected to either hypoxic conditions or treated with nifedipine or mibefradil, L-type and T-type inhibitors, respectively. Hypoxic conditions resulted in little change in arterial tone. Ca^{2+} channel inhibitors showed an average 24% relaxation with L-type channels and 85% relaxation in T-type channels. In the event of oscillating contractions, NiCl_2 or hypoxia were used to investigate the involvement of L-type Ca^{2+} -channels. Hypoxic conditions eliminated oscillatory behavior completely, while NiCl_2 caused no change, indicating a role for L-type channels. These results support the role of L- and T-type Ca^{2+} -channels in sustained force in bovine coronary artery contractions. While hypoxic conditions revealed little involvement of L-type channels, nifedipine results supported a small role for these channels in maintaining force. The larger relaxation with mibefradil indicated a greater involvement of T-type channels in maintaining contraction.

2. GENETIC ANALYSIS OF CINCINNATI AREA *PODARCIS MURALIS* POPULATION AS A INDICATOR OF ACCURACY IN POPULATION BOTTLENECK TESTS

Katherine A. Bartholomew, Megan K. Farrell, Jennifer L. Frank, Jamie L. Gentile, Omari A. Jones-Nelson, Kara C. Knight, Zachary D. Woods (Dr. Dorothy Engle)

Department of Biology

A small population of *Podarcis muralis* lizards was brought to the Cincinnati area from Milan, Italy in the 1950's. The lizards have since established a home in the area and continue to flourish; therefore representing a bottleneck population. There are several tests available to determine if a population bottleneck has occurred. This experiment is intended to use the genetic variability found in the local wall lizard population to determine the validity of one of such tests. After extracting DNA from the tails of the experimental organisms, three different microsatellite loci were analysed for levels of heterozygosity and observed using capillary electrophoresis. The results of the capillary electrophoresis will be entered into a statistical test, which should validate the equation's efficacy in testing for the effect of a bottleneck on the population's genetic diversity.

3. A STUDY OF THE EFFECT OF DESICCATION ON NITROGEN FIXATION IN WHITE CLOVER

Ryan M. Blandford (Dr. Linda Finke)

Department of Biology

This study was undertaken to determine whether desiccation (water deprivation) of white clover (*Trifolium repens*) would have an effect on the nitrogen fixing ability of its symbiotic bacteria (*Rhizobium leguminosarum* – Biovar *trifolii*, *Sinorhizobium meliloti*). It was hypothesized that desiccation would have the effect of reducing nitrogen fixation activity. Clover was planted in three separate pots at a rate of two hundred seeds per pot, and plants were regularly watered to enhance germination and early development. Once seedlings were well-established, the watering regimen was altered so that a different moisture level was produced in each pot, at levels of one, three, and five as determined on a Lincoln Irrigation hygrometer. After three weeks of this differential water treatment, randomly selected plants from each pot were carefully removed and their root systems were assayed for nitrogenase activity by the acetylene reduction assay.

4. THE EFFECT OF ROYAL PEAT INOCULANT ON PHASEOLUS ACUTIFOLIUS, AND ITS ABILITY TO FIX NITROGEN

Aaron M. Brooking, Tim M. Burns (Dr. Linda Finke)
Department of Biology

Nitrogen Fixation is a process required for the biological conversion of atmospheric nitrogen into usable forms. Nitrogen fixation can occur through a symbiotic relationship between a legume plant and its nitrogen fixing bacterial symbiont, or in associations between free-living diazotrophs and plant root systems. The tepary bean (*Phaseolus acutifolius*) is a drought-adapted legume whose roots may be colonized by nodule-producing symbionts. The main objective of this experiment was to test for the effectiveness in nodule production of an inoculant that is used to inoculate other, more commonly grown species of beans, and to measure the amount of nitrogen fixation, if any occurs. Ten seeds of *Phaseolus acutifolius* were obtained and planted in individual pots with the addition of the Royal Peat inoculum. Root systems were inspected for the presence of nodules, and nodulated systems were assayed for nitrogenase activity by the acetylene reduction method.

5. THE IMPACT OF THE INVASIVE SPECIES LONICERA MAACKII ON SOIL NUTRIENT LEVELS

Shannon M. Chambers, Tourag Karkevandian, Joseph R. Lally (Dr. Brent Blair)
Department of Biology

The invasive species *Lonicera Maackii* (Amur Honeysuckle) is thought to have a competitive advantage over native species in Southern Ohio which accounts for its high distribution. We believe that Honeysuckle alters soil nutrient content and thereby has a competitive advantage over native species. Our group collected soil samples from Honeysuckle infested areas and natural areas in Cincinnati forests to observe potential differences in pH, nitrate and ammonia levels. Honeysuckle demonstrated more acidic soils compared to native soils while the nitrogen tests were inconclusive and need further study. The understanding of how Honeysuckle alters its environment for its own success is important in controlling future invasions of Honeysuckle and other invasive species.

6. ANALYZING LEAF LITTER DECOMPOSITION RATES OF THE INVASIVE AMUR HONEYSUCKLE WITH NATIVE SPECIES IN SOUTHWESTERN OHIO FORESTS

Manuel Alvarez, Joseph Dagher, Maya Webb, (Dr. Brent Blair)
Department of Biology

Amur honeysuckle (*Lonicera maackii*) is a multi-stem shrub that has begun to dominate the understory of forests in southwestern Ohio and is preventing colonization of native plant species. Originally a native to Asia, honeysuckle was introduced regionally in the 1800s, and has become extremely invasive. We hypothesized that leaf litter from Amur honeysuckle would have a faster decomposition rate than its native counterparts, potentially affecting soil fertility and enhancing its invasiveness in non-native communities. Leaf litter decomposition rates of the honeysuckle were compared to native species of oak and maple in areas free of honeysuckle and in areas dominated by the shrub. Leaf litter was collected, air-dried, and then placed on the forest floor in small mesh bags to decompose. In all situations, the honeysuckle leaves decomposed faster than each of the native species, even when placed in areas where honeysuckle was not present.

7. VARIATION IN WEIGHT AND LENGTH DISTRIBUTIONS OF THE LIZARD SPECIES *PODARCIS MURALIS* IN SEPARATE LOCATIONS IN CINCINNATI, OHIO

Ashlee A. Dieckmann, Jason L. Go, Thomas P. McComas, Jason W. Westerbeck
(Dr. George Farnsworth)
Department of Biology

Podarcis muralis, commonly known as the European Wall Lizard, is an introduced species in Cincinnati, Ohio whose population originated in Italy. *Podarcis muralis* is an insectivorous old world terrestrial lizard. The species is well adapted to urban environments and is suited to habitats consisting of rock walls, wood piles, thick brush and other surroundings consisting of many cracks, grooves and/or crevasses. The species is estimated to have a life span of approximately seven years and illustrates an oviparous reproductive life

cycle. The goal of this study was to establish population statistics in two locations in the Cincinnati area: Eden Park and Torrence Parkway. Specimens of *Podarcis muralis* were captured by hand over the course of a seven month period and tagged using RFID technology. Data recorded for individual specimens included; date, time of capture, weather conditions, snout to vent length, weight and RFID number. The weight data was broken down into five classes and a G-test was performed to determine whether or not the weights were independent of the two locations. A t-test was also performed on the averages of weight and length to compare populations. The populations of *Podarcis muralis* were different between sites with larger lizards found in Eden Park compared to Torrence Parkway. This may be due to differences in the structure of the two habitats.

8. MEASURING NITROGEN-FIXING ABILITIES OF A RELATIONSHIP BETWEEN WINTER WHEAT (*TRITICUM AESTIVUM*) AND THE BACTERIUM *AZOSPIRILLUM BRASILENSE*

Maricor K. Docena, Katie M. Zak (Dr. Linda Finke)

Department of Biology

The nitrogen fixing bacteria *Azospirillum brasilense* is known to colonize wheat plant roots and provide the plant with essential nitrogen in the form of ammonia, fixed from atmospheric nitrogen gas. While symbiotic nitrogen fixing relationships are well understood, looser associations such as the one between *A. brasilense* and winter wheat also exist and seem to be beneficial to plant's growth. The experiment was designed to explore this relationship. Plants were grown hydroponically and the experimental group was inoculated with *A. brasilense* in the absence of nitrogen in the plant growth medium. Plants given a complete nitrogen-containing medium and those given a nitrogen-free medium without bacteria served as controls. Plant growth was recorded photographically and by measuring dry weight at the end of the experiment. An acetylene reduction assay of the plants' roots was performed to measure the activity of the enzyme nitrogenase, which is responsible for the nitrogen fixing abilities of *A. brasilense* and all other nitrogen fixing bacteria. Preliminary photographic results indicated that positive control plants with nitrogen-containing medium had the best growth while the experimental and second control group appeared the same.

9. GALLIUM DISRUPTS *PSEUDOMONAS* IRON UPTAKE AND SERVES AS A TEST MODEL TO DEMONSTRATE THE APPLICABILITY OF GALLIUM DISRUPTING *MYCOBACTERIUM TUBERCULOSIS* IRON UPTAKE.

Alexander D. Ghaffari (Dorothy B. Engle)

Department of Biology

Iron (Fe) is critical for cellular metabolism and growth. Limiting Fe availability should impair cellular growth in certain Fe superoxide dismutase (SOD) producing species of bacteria. FeSOD is essential in catalysing the dismutation of superoxide into oxygen and hydrogen peroxide. FeSOD is an important antioxidant that dramatically slows or prevents the oxidation of other cellular molecules. Gallium (Ga) is a transition metal that directly competes against Fe uptake. The build-up of reactive oxygen species (ROS) within a cell that cannot produce the amount of FeSOD required for normal growth eventually results in oxidative stress. This model serves to demonstrate the applicability of using Ga to limit Fe uptake in *Mycobacterium tuberculosis* (*M.t*) within the human body. The human immune system makes use of the lethal effects of oxidants by producing ROS in order to kill pathogens. Activated phagocytes produce ROS to destroy the microorganisms that they engulf and consume. Human macrophages, a type of phagocyte, utilize the production of ROS to destroy *M. t*. The data collected in this test model supports the assertion that inhibiting Fe uptake in *M. t* would result in significantly inhibited *M. t* growth.

10. *AZOSPIRILLUM BRASILENSE* NITROGEN FIXATION IN AUXIN INDUCED PARANODULES OF *ORYZA SATIVA L.* (WETLAND RICE) UNDER HYDROPONIC CONDITIONS

Adam M. McHenry (Dr. Linda Finke)

Department of Biology

A unique symbiotic relationship between *Azospirillum brasilense* nitrogen fixing bacteria and the roots of *Oryza sativa L.*, commonly known as wetland rice, was studied in this experiment. Because this symbiosis does not occur naturally with grasses, the plant growth hormone auxin (2,4-Dichlorophenoxyacetic acid)

was utilized to mediate this relationship by enhancing the growth of root para-nodules, similar to those seen in legume roots. Seedlings in the primary experimental group were both treated with auxin (0.5 mg/L) and inoculated with bacteria, while three control groups were treated with bacteria, auxin, or neither. A relatively simple hydroponic growth system enabled the precise control of nutrient levels as the seedlings were cultivated at 28°C (± 2 °C) under natural light conditions. Initial and final plant mass was recorded for quantification of results and acetylene reduction assays were conducted at the close of the experiment. The acetylene reduction assay quantifies nitrogen fixation, and it was used to test both the potentially symbiotic root systems of experimental groups as well as the bacteria alone.

11. **VOCALIZATION DIFFERENCES BETWEEN MALE AND FEMALE CAPTIVE
FLORIDA MANATEES**

Melissa M. O'Brien, Mary C. Ansbro, Gina Mittenzwei, David Phillips, Anthony Kurian,
Cody Dangelser (Charles J. Grossman, Ph.D.)

Vocalizations of captive Florida manatees (*Trichechus manatus latirostris*) were studied to determine if there are any differences in the rate of vocalization frequency or length of squeaks between males and females. Given that the females must communicate with their young in the wild, we hypothesize that female manatees will vocalize at an increased rate compared to males, and that the length of squeaks will differ between the sexes. Two male manatees housed at the Cincinnati Zoo and two female manatees housed at the Columbus Zoo were studied over the course of eight months. Preliminary statistical analysis of the data collected suggested that female squeaks are significantly longer ($p = 1.664 \times 10^{-6}$) than male squeaks with a mean time of 0.319 seconds for the females and a mean time of 0.275 seconds for the males. The data has also shown a highly significant difference ($p = 2.399 \times 10^{-5}$) between the rate of male and female manatee vocalizations with a mean time between female squeaks of 51.3 seconds and a mean time of 108.8 seconds between male squeaks. From these preliminary studies, the results also suggest that vocalizations taking place are complex enough to be used for communication between animals. Additional data is currently being analyzed in order to further explore differences in manatee vocalization.

12. **CRANIODENTAL MORPHOLOGY IN SKUNKS AND MONGOOSES**

Luke Rothan (Dr. William Anyonge)

Department of Biology

This study was undertaken in order to investigate the generation of bite forces in the skulls of the common mongoose (*Herpestes edwardsi*), the striped skunk (*Mephitis mephitis*), the western spotted skunk (*Spilogale gracilis*), and the meerkat (*Suricata suricata*) in relation to their dietary preferences. All of these species share an omnivorous diet, feeding heavily on insects, spiders, small mammals, lizards, birds, eggs, nuts, and berries. In addition, *H. edwardsi* and *S. suricata* are well known for their swift speed and skill in killing poisonous snakes with a single bite to the neck without being hurt. Based on these predatory habits of *H. edwardsi* and the *S. suricata*, it was hypothesized that these species would exhibit a larger bite force at the front of their jaws (where greater force is needed to swiftly kill prey), namely at the first canines, than *M. mephitis* and *S. gracilis*. Four cranial and 7 mandibular measurements were made on each skull and then used to compute several indices that estimated the size of jaw-closing muscles (masseter and the temporalis) and their relative moment-arms. An analysis of variance (ANOVA) was performed on the transformed indices and tested for significant differences. The results did not support the hypothesis. *S. gracilis* and *M. mephitis* exhibited greater mechanical advantage (larger bite forces) at both the first lower molars and lower canines in comparison to *H. edwardsi* and *S. suricata*. *H. gracilis* and *M. mephitis* displayed also larger temporalis muscles and shorter jaw lengths. It can be inferred that the latter species have evolved skull morphologies that are adapted to generating large bite forces.

13. TRAP-TO-TRAP DISTILLATION OF VOLATILE ORGANIC LIQUIDS

Tyler D. Borg (Dr. Craig Davis)

Department of Chemistry

Trap-to-trap distillation is a technique used to separate volatile, air sensitive compounds. Normal distillation techniques cannot be used to separate these unstable compounds, which might decompose or even explode upon exposure to oxygen (or moisture). To perform a trap-to-trap distillation a series of U-tubes are immersed in liquid nitrogen and organic solvent slush baths that begin with the warmest and progress to the coldest. The reaction mixture is pulled through the traps under vacuum. The least volatile liquid (highest boiling point) is caught in the first trap, and the more volatile liquids (lower boiling point) are caught in the successive traps. This project involves the design and implementation of a protocol to illustrate the useful nature of this technique. We are attempting to work out the protocol with ordinary organic liquids. The relative abundance of each liquid in each trap is monitored by NMR Spectroscopy. Accordingly, only liquids with a single proton resonance were selected to ease in the visual comparison of their abundance. The method has been refined, and expanded from a two component mixture utilizing a two bath system, into a three component mixture utilizing a three bath system. This has allowed a greater degree of separation between compounds, as well as broader application of the technique itself.

**14. ANALYSIS OF COPPER, MANGANESE, AND IRON FROM WET AND DRY ASHING
PREPARED CEREAL AND WHEAT GERM SAMPLES BY FLAME
ATOMIC ABSORPTION SPECTROSCOPY**

Marshall Bynum and Toni Elwell (Dr. Barbara M. Hopkins)

Department of Chemistry

Flame atomic absorption spectroscopy (FAAS) is an analytical technique frequently used to determine the concentrations of elements in a solution. Some of these elements are essential to nutrition. With FAAS it is possible to determine the amount of these beneficial minerals provided in a certain food source. Such elements comprised in wheat germ were determined with FAAS, namely copper, manganese, and iron. For accurate analysis, it is vital that the preparation method completely dissolves the food sample. The initial and most accurate method developed was a combination of wet and dry ashing using 10% nitric acid, 1 + 1 nitric acid, and heating. Once dissolved, the food samples were analysed using the Varian AA240FS instrument and verified by the analysis of commercial AAS element reference standards. Single and multi-element AAS reference standards and wheat bran reference material were analysed using the combination wet and dry ashing method of a previous student. While this method was accurate for iron and copper in the wheat bran reference material, the trace amount of manganese was never determined accurately. Numerous variations of wet ashing methods were tested with a variety of solvents on the reference material, but none were more successful than the original. Using this method Bob's Red Mill Wheat Germ was accurately analysed. After Kroger flavoured oatmeal yielded error in analysis, focus was directed to the analysis of Cheerios using the original method developed. Currently the research is aimed at determining the exact accuracy and reproducibility of this method's capability of determining the amount of nutritionally beneficial elements in these specific food samples.

**15. DEVELOPMENT OF IONIC LIQUID-SUPPORTED CATALYSIS
BY IMINIUM ACTIVATION**

Amy L. Grote, Joseph M. Cosco and Nina R. Collins (Dr. Richard J. Mullins)

Department of Chemistry

An emerging topic in the area of organic synthesis involves the use of ionic liquid (IL) supported reagents, substrates and catalysts for greener synthetic processes. While several inorganic catalysts have been bound to ionic liquids, the binding of organic catalysts has not received as much attention. Although a few IL-supported proline derivatives have been explored, to date, no examples of IL-bound catalysis via iminium activation have been put forth. Thus, in our group, several novel ionic liquid-supported organocatalysts will be designed and synthesized for their application in green organic synthesis. These catalysts will be examined for their efficiency and selectivity in effecting a number of asymmetric transformations in ionic liquids. The enhanced ability to separate the organic products from the ionic liquid phase without extracting the catalyst will result in efficient and reusable catalyst/solvent systems. Our progress toward the development and application of these systems will be presented.

19.

OXYGEN-ACTIVATING NICKEL(II) COMPLEXES

Andrew Lipchik (Dr. Craig Davis)

Department of Chemistry

Traditional oxidizing agents, such as hexavalent chromium, are both costly and environmental hazards. A preferred oxidizing agent would be molecular oxygen, which is both inexpensive and benign. The challenge is to develop catalysts which can activate molecular oxygen. Our group has begun a collaboration with Dr. Michael Baldwin of the University of Cincinnati to devise nickel(II) catalysts to accomplish this goal. Nickel(II) is normally inactive towards oxygen activation due to the inaccessibility of its higher charge states, but the addition of electron donating ligands lowers the oxidation potential of nickel(II). The Baldwin Group has observed that a Ni(II)-TRISOX complex can activate oxygen catalytically. Unfortunately, after ten turnovers the catalyst stops functioning; the cause is unknown at this time. We thought one remedy would be to use a bulkier ligand. Our group synthesized the TRIPHOX ligand, which substituted a *phenyl* group (hence TRIPHOX) for a smaller methyl group. The Ni complex with our new TRIPHOX ligand was synthesized, and its crystal structure was solved. The complex did oxidize methanol, but quantification via the Hantzsch Reaction showed the oxidation was stoichiometric and not catalytic.

20. STUDIES DIRECTED TOWARD THE SYNTHESIS OF A COCKROACH PHEROMONE ANALOGUE

Daniel J. Paulus and Christopher T. Wilker (Daniel J. McLoughlin)

Department of Chemistry

The natural sex attractant pheromone for the German cockroach *Blattella germanica* was recently reported in the literature. The pheromone was isolated, its structure determined, and synthesized. Our group has two goals to our research design: First the re-synthesis of the pheromone (3,6-dioxocyclohexa-1,4-dien-1-yl)methyl 3-methylbutanoate (common name blattellaquinone). The purpose of this re-synthesis was to examine the possible use of the reaction sequences as a method of teaching an oxidation reaction involving Cerium Ammonium Nitrate. The synthesis has been performed in both the presence and the absence of DMAP as a catalyst and proton-NMR has been utilized to follow the progress of the reaction and to identify the products. Attempts to following the progress of the reaction with GC techniques did not prove to be an advantage over use of proton-NMR techniques. In addition to repeating the literature synthesis of blattellaquinone, our second goal of this research is to make a new analogue of the *Blattella germanica* pheromone by utilizing a Friedel-Crafts reaction type in the synthetic sequence. The reaction steps necessary to produce 2-(3-oxohexyl)benzo-1,4-quinone by using 2,5-dimethoxybenzyl alcohol and 1-pentene-3-one in acidic conditions and that analysis of the reaction progress via proton-NMR and the comparison of the NMR results with computer generated NMR spectra will be discussed.

21. DEVELOPMENT OF A METHOD FOR ANALYSIS OF ORGANO-ARSENIC COMPOUNDS IN AIR

Katherine E. Vessels (Dr. Barbara M. Hopkins)

Department of Chemistry

Such arsenic containing compounds as roxarsone (4-hydroxy-3-nitrobenzenearsonic acid) and *p*-arsanilic acid have been used as growth promoters in chicken feed. Workers in factories where poultry feed is produced may be exposed to these organo-arsenic compounds, necessitating the development of methods for air sampling in such environments. In this work both roxarsone and *p*-arsanilic acid are determined in the same sample using polyvinyl chloride filters as a proper sampler for collection of these compounds from air. Following desorption of the filters with methanol, the compounds are reacted with 1,3-propanedithiol converting them to cyclic dithiaarsenolines, which are then detected by Gas Chromatography-Mass Spectrometry (GC-MS). The method is tested against the National Institute for Occupational Safety and Health (NIOSH) criteria. Recovery studies are performed to detect the compounds at various levels of the Permissible Exposure Limit (PEL) and a storage study determines the stability of filters spiked at the level of the PEL. Recoveries for *p*-arsanilic acid were 96.3% (0.1 x PEL), 96.4% (0.5 x PEL), 98.6% (1 x PEL), 109.9% (2 x PEL) and recoveries for roxarsone were 101.0% (0.5 x PEL), 99.5% (1 x PEL), 101.0% (2 x PEL). At the 0.1 x PEL level roxarsone was not detected. The storage study showed the compounds to be stable on the filters for at least a period of 14 days. These results satisfy the criteria of NIOSH for an analytical method.

22. STUDIES DIRECTED TOWARD THE SYNTHESIS AND USE OF FLUORINE LABELED ETHENO COMPOUNDS AS A MEANS OF CHARACTERIZING PROTEIN FOLDING

Jenna M. Vogl and Christopher C. Stobart (Dr. Daniel J. McLoughlin)

Department of Chemistry

Many modern spectroscopic techniques may be utilized to examine the process of protein folding. The study of protein folding has been greatly advanced in recent years by the development of a number of different fast, time-resolved techniques. One of these techniques utilizes a rapid-mix (stopped-flow) F-19 NMR. Developing a molecular probe contain a fluorine atom would potentially assist in the examination of the folding of any proteins that would bind to this probe. A probe that contains a fluorine labeled adenosine should prove useful in that proteins that bind adenine as a portion of a substrate are abundant in metabolic pathways. Past investigators have shown etheno-adenosine compounds to be useful spectrofluorometric tools to examine the equilibrium binding and kinetics of several enzyme systems. Progress from our laboratory will be presented involving the synthesis of fluorine labeled etheno-adenosine compounds. In addition to being useful in spectrofluorometric studies, these compounds should also serve as useful tools for the F-19 NMR examination of protein structure. Compounds of this type may also prove useful in future investigations of the kinetics and thermodynamics of protein folding.

23. USING THE LESLIE MATRIX TO MAXIMIZE THE SUSTAINABLE YIELD FROM A POPULATION

Megan Koerner (Dr. Bernd Rossa)

Department of Mathematics and Computer Science

A population will be set up and a Leslie matrix will be used to describe the population. This Leslie matrix will take the population from one time step to the next. From this Leslie matrix, the dominant eigenvalue is also the growth factor of the population. Using Bedding and Taylor's paper, the process for finding the highest sustainable yield for the population will be found by altering the Leslie matrix. The cropping style that will be used to maximize the yield will be by eliminating one age class entirely and partially removing another.

24. A MATHEMATICAL JUSTIFICATION FOR PHYSICISTS' USE OF THE DIRAC DELTA

Sean P. Bartz (Bernd Rossa)

Department of Mathematics and Computer Science

The Dirac delta is an important mathematical object, whose study is motivated by its many applications in physics. Although physicists treat it as an ordinary function with a few unusual properties, the Dirac delta actually belongs to a class known as generalized functions. From this treatment, it is shown that the Dirac delta does indeed have the properties that physicists require. Results from the theory of generalized functions justify the intuitive approach used by physicists. I also explore some physical examples that make use of the Dirac delta.

25. THE SIRE MODEL AND MODELING THE EFFECT OF EDUCATION ON THE AIDS EPIDEMIC

Benjamin J. Milroy, (Hem Joshi),

Department of Mathematics and Computer Science

The HIV virus has killed more than 25 million people since its discovery in 1981, making it one of the most deadly epidemics in history. In 2007 alone, 33.2 million people were affected worldwide. Using a group of ordinary differential equations, known as an SIR model, one can predict the spread of a disease and determine how quickly it will move through a population. Using a variation of that model that incorporates an educational component about the disease, I will discuss how preventative measures can potentially slow the spread of HIV and minimize the vertical transmission of the disease. The model demonstrates how convincing those susceptible to HIV to use abstinence, fidelity, and condoms can curb the spread of the virus. Using data obtained from the real life transmission numbers in Uganda, I will illustrate the model and discuss its accuracy.

**26. THE EXPECTED VALUE AND STANDARD DEVIATION OF LOG TRANSFORMED
NORMAL DATA**

Karen Moebius (Dr. Max Buot, Dr. Marco Fatuzzo)

Departments of Mathematics and Computer Science and of Physics

We explore the relationship between the expected value and standard deviation of normal data to the corresponding measures for the distribution generated via a log transformation of this data. We perform this analysis via numerical simulation, numerical integration, and analytical expansion.

**27. FABRICATION OF THIN METAL CIRCUITS USING VACUUM DEPOSITIONS FOR
MEASUREMENT OF MAGNETIC BACTERIA**

Kyle W. Agar (Dr. Steven Herbert)

Department of Physics

Utilizing the metal vacuum deposition system, this research is focused primarily on the process of creating miniature circuits for the purpose of measuring the magnetic fields of magnetic bacteria. This is done by placing the magnetic bacteria in a lithographically designed miniature circuit and measuring the effects on the bacteria based on Faraday's Law. This process involves creating recipes for deposition techniques as well as photolithographic shrinking.

28. COMPUTATIONAL SIMULATION OF QUANTUM POTENTIALS

Sean P. Bartz (Dr. Marco Fatuzzo)

Department of Physics

Only a few classes of quantum potentials avail themselves to analytic solutions. Because of this, computational techniques are useful for solving arbitrary quantum systems. The Schrodinger Equation that must be solved is a partial differential equation. Such problems are difficult to solve through computational methods. We begin by understanding the methods and writing problems to solve simpler partial differential equations, namely those of diffusion and of wave mechanics. We then move on to solving the Schrodinger Wave Equation in one dimension.

29. IMPLEMENTING THE SPATIAL LIGHT MODULATOR INTO OPTICAL TWEEZING

Meredith Henstridge, Dennis Tierney (Dr. Heidrun Schmitzer)

Department of Physics

The goal of this research is to manoeuvre helical bacteria by means of optical tweezing. When light converges at a focal point of a certain minimum intensity, there is a gradient force present. Thus, when an object of the microscopic order is within the parameters of this focal point, the effect of the gradient force upon this object is that of a "trapping" nature; the object will not be able to move out of the focal point (trap). The utilization of this trapping property is the foundation of optical tweezing. The optical tweezing done in this research was facilitated by the Spatial Light Modulator, a device used for shaping the focus. Specifically, the Spatial Light Modulator was used to simulate a line focus. The line focus was used for trapping because its shape conforms to that of the helical bacteria, thus yielding a more effective trap. Because trapping bacteria can be difficult due to their irregular shape, the first objective was to ensure a minimum effectiveness of the trap by trapping a simpler medium. Microscopic beads were used, a solution of which was placed on the slide. When the setup was properly aligned, it was possible to trap about two to three beads per line focus.

**30. INVESTIGATING THE LIGHT CURVE OF A LONG PERIOD VARIABLE STAR USING
PHOTOMETRY**

Andrew G. Herbert (Professor Richard Hamilton)

Department Of Physics

A variable star is a star whose intensity (the brightness of the star) varies in time. Some variable stars actually have their intensities oscillate in a sinusoidal manner, and as such have a period that can be measured. This research project was designed to make a light curve of a variable star, and to verify the light curve by checking it against accepted data for that star. The star chosen was Mira, one of the standard examples of a long period variable star. Over a period of several months, data was taken reading the intensity levels of Mira as it progressed through its cycle.

31. AMBIPOLAR DIFFUSION IN SHEARED MAGNETIC FIELD GEOMETRY

Akshayan Rajasingam (Dr. Marco Fatuzzo)

Department of Physics

The interstellar molecular gas in our galaxy is found to lie within large clumpy cloud-like complexes. The gravitational collapse of the densest clumps of these complexes then leads to the formation of stars. However, the dense clumps are often observed to be supported against gravity by the magnetic fields that thread them. Ambipolar diffusion is the mechanism believed to be responsible for the loss of magnetic support in this environment. This mechanism has been studied extensively both analytically and numerically. Here we extend previous studies by considering the diffusion equations for a simplified slab structure of molecular gas threaded by a sheared magnetic field. Our analysis requires both analytical and computational techniques.

32. ATMOSPHERIC DISPERSION: THE CONNECTION BETWEEN AIR POLLUTION AND ATMOSPHERIC DYNAMICS

Steven D. Plachinski (Mrs. Amy Frohlich)

Department of Physics

How is air pollution dispersed by microscale and mesoscale atmospheric circulations? We will examine the process of atmospheric dispersion in three distinct ways. First, a statistical analysis of the link between air quality and atmospheric dynamics will be performed. Daily air quality index (AQI) and meteorological data for Cincinnati will be compared for the months of August 2007, September 2007, January 2008, and February 2008 in order to identify correlations between air pollution fluctuations and certain meteorological events. Second, a simple atmospheric dispersion model will be developed in order to mathematically simulate the dispersion of pollution in the atmosphere. Equations modeling the parameters of both atmospheric turbulence and pollution emission will be employed in the creation of this model. Third, air sampling was conducted during the implosion (March 22) of the Zumbiel packaging plant on the east side of campus in order to examine the dispersion of generated particulate matter. The analysis of this sampling will be compared with March 22 meteorological data so as to determine how the atmospheric conditions impacted the particulate dispersion.

33. INCREASING PROFESSORS' RECYCLING BEHAVIOR: THE EFFECTS OF CENTRAL AND PERIPHERAL ROUTES OF PERSUASION

Katherine E. Buxton (Dr. Christian End)

Department of Psychology

The present study aimed to increase recycling behavior among faculty members at a private university through use of persuasive emails. Emails were designed to employ either a central (analytical and fact based) or peripheral (emotional) route of persuasion to persuade the faculty member to request a desk side recycling bin. The central route email was hypothesized to be more effective in persuading the faculty member, as research indicates that a central route of persuasion appeals to the analytic individual. Faculty members with permanent offices were selected based on the potential of needing a recycling bin. Requests that were sent to the physical plant for a desk-side recycling bin were used to indicate recycling behavior. Although emails had an overall positive effect (a total of 23 faculty members requested a desk side recycling bin), a chi-square test determined that there was no difference in the effectiveness of the persuasion routes (10.5% of the faculty in the central group and 12.1% of the faculty in the peripheral group requested a bin), $p=.73$. The equivalent increase across persuasive conditions suggests some aspect other than appeal type accounts for this response. Also, many faculty members reported existing recycling habits, thus it is plausible the researcher encountered a ceiling effect.

34. HOW WELL CAN A BLONDE RUN AN EXPERIMENT?: THE EFFECTS OF DISPARAGING HUMOR ON PERCEPTIONS OF COMPETENCY

Kara M. Caudell (Dr. Cynthia Dulaney)

Department of Psychology

This study examined the effect that disparaging humor has on perceived levels of competency of women with blonde hair. All participants read 10 jokes. In the blonde joke group, 7 of the 10 jokes portrayed blondes as less intelligent and as sexual objects. In the neutral joke group, there were no disparaging jokes about blondes. Participants completed a questionnaire pertaining to how humorous they found the jokes to be. Competency of the experimenter, who had blonde hair, was then rated. Demographic features such as

sex, age, race, year in school, and hair color were collected, after which the participants were debriefed. Thus far, data has been collected from 43 of an anticipated sample of 50 participants. The preliminary analysis of the data of the 43 participants reveals a marginally significant effect due to lower ratings of experimenter competency by the participants who received the disparaging jokes about blondes than those who received the neutral jokes, $t(41) = 1.95, p = .058$. The mean competency score of the blonde joke group was 30.82 ($SD = 3.59$), and the mean competency scores of the neutral joke group was 32.71 ($SD = 2.70$). These preliminary results suggest that disparaging humor has a negative effect on the perceptions of the individuals targeted in the jokes.

35. THE EFFECT OF SELF-SACRIFICIAL LEADERSHIP ON HELPING BEHAVIOR WITH RELATIONS TO BELONGINGNESS

Tracy L. Gnadinger (Dr. Christian End)

Department of Psychology

The present study examined the effect of self-sacrificial leadership on helping behavior, and the relationship between helping behavior and two types of belongingness (work place and interpersonal). Previous research has confirmed that charismatic leadership increases employee helping behavior, especially amongst those with low work place belongingness (Den Hartog, De Hoogh & Keegan, 2007). It was first hypothesized that there would be a greater amount of helping behavior with the presence of self-sacrificial leadership. It was hypothesized that with the presence of self-sacrificial leadership, employees would report a greater amount of helping behavior and that both types of belongingness would be positively correlated with helping behavior. Sixty-four participants were randomly assigned to read a scenario describing an electronics company and its president. One half of the participants read the scenario, which described the president as self-sacrificial, whereas the other participants read the same scenario description without mention of the president's self-sacrificial characteristics. Consistent with the hypothesis, a t-test revealed that participants reported a greater willingness to help when the president exhibited self-sacrificial characteristics, $t(62) = 1.82, p = .07$. No significant relationships were found between belongingness types and helping behavior. Future research in the field of industrial psychology should continue to identify other factors that influence organizational citizenship behaviors, like helping.

36. THE IMPACT OF A POST EVENT WARNING AND PERCEIVED EXPERTISE ON THE PREVENTION OF THE MISINFORMATION EFFECT

Suzanne J. Hoskin (Dr. Christian End)

Department of Psychology

The current study examines the impact of a post event warning and perceived expertise on the prevention of the misinformation effect. 87 randomly assigned college students participated in a study they believed to be on event perception. Participants viewed a 40 second clip of a car accident and those participants in the experimental condition were exposed to a written warning against the misinformation effect attributed to a police officer or a psychologist. Participants took a quiz over the video clip containing leading questions to determine whether the warning successfully prevented the misinformation effect. It was hypothesized that a warning would decrease the frequency of the misinformation effect, and the results demonstrated that the warning was partially effective, but the source of the warning had no effect. It was hypothesized that the psychologist cited warning would be more effective in preventing the misinformation effect, but the effectiveness was found to be inconsistent across items. Despite the police warning being marginally effective, the source of the warning had no effect on preventing misinformation. These results indicate that further research is needed to find new ways to effectively prevent the misinformation effect.

37. THE INFLUENCE IMPRESSION MANAGEMENT TACTICS HAVE ON NEGATIVE ATTITUDES TOWARDS ACCENTED SPEAKERS

Mary Bridget Mathews (Dr. Christian End)

Department of Psychology

Psychologists have established that ethnic cues, such as one's name and/or accent negatively affect interviewers' decisions, albeit implicitly. In contrast, impression management tactics, which are specific behaviors candidates engage in to project a favorable image of themselves, positively impact interviewer ratings (Bolino & Turnley, 2003). The current study examined if impression management tactics can

neutralize the impact of negative attitudes toward candidates who have a foreign accent. 133 college students participated in a job candidate evaluation study. Upon arrival, participants were randomly assigned to one of four conditions and listened to a recording of an employment interview. An accented or unaccented candidate either did or did not utilize impression management tactics; specifically, directly complimenting the interviewer, positively speaking about overcoming obstacles in the workplace and complimenting the company's successes. Participants reported their interpersonal attraction toward the candidate, completed a survey evaluating their attitudes toward accented speakers and responded to four questions concerning overall employment suitability about the candidate. Manipulation checks demonstrated that the manipulations of the independent variables were effective. The hypothesized main effects and interaction of impression management and accent were not confirmed, p values ranged from .07-.99. Possible explanations for these findings could be that in our rapidly growing global economy foreign accent is not viewed as negatively.

38. DOES THE BYSTANDER EFFECT OCCUR IN COMPUTER MEDITATED COMMUNICATION?

Jeffrey Meinert (Dr. Christian End)
Department of Psychology

Empirical research has established a bystander effect occurs in helping situations. This effect refers to the finding that someone is less likely to help when other people are present compared to when the person in need is alone. Although the effect has been replicated in a variety of contexts, research has neglected to determine if this effect occurs in response to request for help via Computer Mediated Communication (CMC). This study investigated whether a CMC bystander effect exists. It was hypothesized that as the number of names on an email recipient list increased, the likelihood of receiving help decreased. 150 students were selected from a private Midwestern University, and randomly assigned to receive an email that varied only in number of names that appeared in the address field of the email (co-recipients). The 5 conditions were; none, 1, 2, 4, or 8 co-recipients. The content of the email was a simple request that any participant would be capable of answering. The results indicated that proportion of participants who helped was equal regardless of the number of co-recipients. The 4 conditions with co-recipients were collapsed into one group to determine if a difference in helping existed between the none and co-recipient conditions. The results indicated participants in a co-recipient condition helped significantly less than the participants who were the sole recipient. The findings partially support the idea of a bystander effect, as the number of names increased on the recipient list, the likelihood of receiving help did not decrease, but adding a co-recipient did significantly decrease the chance of receiving help.

39. GENDER FRAMING EFFECTS ON PERCEIVED SEXUAL HARASSMENT

Meredith Nelson (Dr. Cynthia Dulaney)
Department of Psychology

Previous research indicates that behavior of males is more often construed as sexual harassment than behavior of females (Katz, Hannon, & Whitten, 1996). The current study examined the difference in ratings of sexual harassment when a male was framed as a perpetrator of a possibly sexually harassing behavior versus when a female was framed as a perpetrator. Participants rated, on a 7-point scale, the level of sexual harassment in situations between a man and a woman. One half of the participants received a questionnaire that contained situations in which a male was the perpetrator (with a female victim), and the other half of the participants received a questionnaire that contained situations in which a female was the perpetrator (with a male victim). An independent samples t -test showed no significant difference in sexual harassment ratings between the male and female perpetrators, $t(42) = 0.76$, $p = 0.45$. An exploratory analysis comparing sexual harassment ratings of male versus female participants indicated that female participants were more likely to rate situations as sexually harassing than male participants, $t(42) = 2.2$, $p = 0.03$. Results of this study indicate that among college-age students, the gender of a perpetrator of sexually harassing behavior is not a significant factor in determining how an individual perceives instances of sexual harassment. However, one's own gender can affect how he or she perceives instances of sexual harassment.

40. THE INFLUENCE OF RACIAL ATTITUDES AND CIRCUMSTANCES ON THE JUDGMENT OF A VICTIM

Keila A. Roman (Dr. Cynthia Dulaney)

Department of Psychology

Of the many factors that could influence judgment of a victim, racial attitudes and circumstances surrounding a victim's situation were investigated in this research. Eighty participants received an excerpt portraying either an African American or a Caucasian victim, who was infected with HIV either by not using a condom, or using a condom that broke. Afterwards, participants answered eight questions on a Likert scale, with two of the questions measuring behavioral responsibility. A Condom Use x Race analysis of variance on behavioral responsibility showed a significant main effect for condom use on behavioral responsibility, $F(1, 76) = 13.43, p < .02$. Those who used a condom were rated as more responsible than those who did not use a condom. There was no main effect of race nor was there a significant interaction. These results suggest that people are judged as more responsible based on the situation rather than on their race.

41. DO SPORT FANS "GET OVER IT"? THE IMPACT OF MEMORIES ON HIGH AND LOW IDENTIFYING FANS' MOOD, SELF-ESTEEM, PERCEIVED COMPETENCIES AND PERFORMANCE

Keila Roman, Jeff Meinert, Joe Welling, Greg Mauntel, Molly O'Connell, and Shaye Worthman (Dr. Christian End)

Department of Psychology

Past research indicates that teams' performances affect sport fans' moods and self-esteem (Hirt et al., 1992). This study was conducted to determine if these effects reoccur. Specifically, researchers investigated the effect of sport-related memories on high and low identifying sport fans' mood, self-esteem, perceived competencies, and performance. Using the Sport Spectator Identification Scale, high and low identifying fans were randomly assigned to write about their best or worst team memory. Participants then completed a mood scale, self-esteem measure, predicted personal competencies, and performed four tasks: mental, motor, social, and chance tasks. Highly identified fans reported higher positive affect after writing about positive memories ($p=.07$), while also experiencing significantly greater negative affect after writing about a negative memory ($p<.001$) than low identifiers. Additionally, highly identified fans perceived that they were more competent on mental skills tasks and performed better on motor skills tasks than low identifiers ($p<.001$). Although high identifying sport fans report experiencing stronger emotional reactions to sport memories than low identifying fans, high identifiers seem to have "gotten over it" and thus the painful memories do not affect fans' self-esteem, perceived competencies, and personal performance. Future research should investigate if the recency of the memories differentially impacts fans.

42. RELIGIOSITY AND ADJUSTMENT IN FIRST-YEAR COLLEGE STUDENT-ATHLETES

Katharina E. Wetterau (Dr. Christian End)

Department of Psychology

Research found more student-athletes integrating their religiosity into their lives to cope with the stress of adjusting to college (Storch, Storch, Welsh, & Okun, 2002). The current study examines the correlation between the level of religiosity of first-year student-athletes and non-athletes and whether or not they use their religiosity as a coping mechanism for the stressors and adjustment challenges throughout the first-year of college. Participants included fifty-six college students from a small, private institution. Twenty-seven participants were first-year student-athletes and 29 participants were first-year non-athlete students. The participants completed the Duke Religion Index Survey (Hill & Hood 1999) to correlate the level of religiosity between athletes and non-athletes. Participants also completed The Transition to College Survey to determine if participants indicating a higher level of religiosity positively correlated with participants who use their religiosity as a coping mechanism for the stressors and adjustment challenges throughout the first year of college. Results found no significant difference between the levels of religiosity found in athletes verse non-athletes. Exploratory correlations between religiosity and outcome variables indicated a lack of significance. To find more of a difference between levels of religiosity, future researchers should consider performing the study at a larger, public institution.

43. HOW FAR IS TOO FAR?: THE EFFECTS OF TRANSGRESSOR CLOSENESS AND OFFENSE SEVERITY ON THE FORGIVENESS EXPERIENCE

Marie E. Westerheide (Dr. Christian End)

Department of Psychology

After identifying factors believed to be important determinants of forgiveness, McCullough et al. (1998) concluded that an intensive study of particular factors is necessary to further forgiveness research. The current study examined whether offender closeness and transgression severity predict forgiveness difficulty. 127 participants were randomly assigned to one of four scenarios concerning a personal interaction with a transgressor. Each of these scenarios manipulated the closeness of the transgressor (best friend or stranger) and the severity of the offense (physical harm or failure to meet expectations). After writing their imagined reaction to one of these transgressions, the participants completed a modified Transgression-Related Interpersonal Motivations (TRIM) inventory (McCullough et al., 1998) and the Forgiveness Experience Scale (Williamson & Gonzales, 2007). It was hypothesized that participants would express more difficulty with the task of forgiving a severe offense as well as a distantly related transgressor (stranger). The results of ANOVAs indicated that less forgiveness occurs with severe transgressions ($p < .001$). The results also indicated that participants have more difficulty forgiving a stranger rather than a friend ($p < .01$). Those trying to forgive a distantly-related transgressor, who committed a severe offense, exhibit the lowest intentions to forgive ($p < .01$). Thus, clinical psychologists working with victims of abuse or neglect might be advised to consider how factors of severity and closeness could impede the forgiveness process.

ORAL PRESENTATIONS

Please consult posted signs for room assignments and times.

GESTALT : A VISUAL STUDY IN FORM AND FUNCTION

Olivia K. Hinds (Dr. Bruce Erikson)

Department of Art

Gestalt is a thesis body of artwork studying the relationship of forms and functions in nature. The collection of work is the culmination of research that I performed by studying artists such as Georgia O'Keeffe, Edward Muybridge, and David Hockney to name a few. My field research consisted of exploring nature and looking at form in plants and animals as similar shapes with different functions or similar functions with different shapes. For example, trips to the Cincinnati zoo allowed me to look first-hand at different animals that I may not otherwise come in contact with. Furthermore, living on a farm also allowed me to hike and explore nature in an unadulterated environment. My work and research has spanned my final year at Xavier University and is a visual discussion about my love and respect for nature as well as a message of the interconnectivity of all species. My time here at Xavier has been instrumental in my growth as an artist as well as a human being and my body of work is, also, a testament to the experiences that have shaped me here at Xavier University. I think that Gestalt is precisely a celebration of my research and creative activity in the form of an art exhibition.

INHERITANCE: A SERIES OF PRINTS

Christine E. Jackson (Prof. Suzanne Chouteau)

Department of Art

This series of prints results from explorations of various printing techniques (woodcut, etching, monotype, and Xerox transfer), which are utilized in a search for the expressive potential of each. The work expresses the intrinsic connection between the past and the present through an examination of things, both physical and metaphysical, that are left behind after death. It exhibits a broad spectrum of subject, ranging from extremely personal traits, objects, and expressions, to a more widespread analysis of social practices that have affected the present and will affect the future. The goal of the series is to demonstrate how the life and destiny of an individual is intricately entwined with the past forming a bridge between the past and the future and ultimately uniting one world with the next.

SYLVIA PANKHURST: ARTIST AND ACTIVIST

Deanna Kimball (Prof. Suzanne Chouteau)

Department of Art

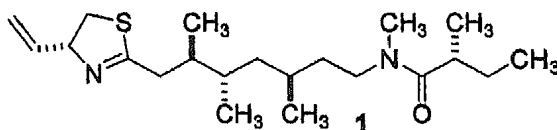
Estelle Sylvia Pankhurst, perhaps one of England's most celebrated women, is remembered foremost for her contribution to women's enfranchisement in the early twentieth century. Though overshadowed by the boisterous and, at times, aggressive personalities of her mother and sister, Sylvia made a difference as the artist behind the Women's Social and Political Union. A typical woman of her times, Sylvia experienced loss and hardship in a world that devalued women for no reason other than gender. Women were forced to risk their lives in factories and at coal mines in order to put even minimal food on the table. It was a struggle for survival and a sacrifice of dreams for the sake of reality. Like any other woman of her day (and even today), Sylvia was faced with heart-wrenching choices, the hardest of which was the eventual decision to abandon her first love for a cause that she felt needed her more. For years, she struggled between this love of art and a heart set on activism and making a change. Working for the Women's Social and Political Union, she became totally immersed in the art aspect of it, finding a perfect balance between what she believed in and the art which she wanted to create. As her life went on, it became less about the art and more about making a change. Ultimately Sylvia found that she could not immerse herself wholeheartedly in both of her passions.

EFFORTS TOWARD THE SYNTHESIS OF (+)-KALKITOXIN

Adeleke A. Oni (Dr. Richard J. Mullins)

Department of Chemistry

The lipopeptide (+)-kalkitoxin (1), a metabolite produced by a member of the *Lyngbya majuscula* family of cyanobacteria, has been shown to exhibit several antiproliferative biological properties. The most noteworthy of these properties is its cytotoxicity to an array of aquatic creatures as well as toxicity to rat neurons and human colon cancer cell lines. On the basis of this interesting bioactivity profile, we have embarked on a quest to better understand the manner by which it prevents the growth of tumor cells. Our efforts toward the total synthesis of kalkitoxin, featuring the conjugate addition of an allylic stannane for preparation of the aliphatic core will be presented.



ARISTOTELIANISM IN Gnostic THOUGHT: THE CASE FOR A CONNECTION

Christopher C. Gibson (Dr. Jeffrey Cooley)

Department of Classics

The focus of this paper is twofold. Initially, it addresses the theological argument behind the *Metaphysics* of Aristotle, and then gives a brief discussion of some basic tenets of early Gnosticism. My thesis is that the theological conclusion of Aristotle may have had a significant influence on the development of certain Gnostic beliefs. To prove this thesis, I first discuss the two theological systems in general terms, and then I attempt to show distinct similarities between the two. In arguing this point, I rely on the *Metaphysics* as the principal primary source, though I also make use of certain early Gnostic texts.

HAVELOCK'S POSTULATE ON DIDACTIC LITERATURE: ITS INSUFFICIENCY WHEN TAKEN WITH VICO'S FORMULATION OF HISTORICAL CRITICISM

Thomas Gezella (Dr. Shannon Byrne-Cueva)

Department of Classics

In my paper I shall address Eric A. Havelock's notion of the didactic nature of Homer's epic poetry. In his Preface to Plato (1963), Havelock argues that a number of the actions and quarrels that arise in Homer's epic poems actually resemble aphorisms which were included precisely to bestow a didactic form to the epic. As such, Havelock conceives the whole of the Iliad or Odyssey as an encyclopedic means to preserve

both the public customs and private standards of Greek culture. In other words, the poems have a didactic purpose. Havelock reaches this conclusion by exploring the generalized speeches and actions of the figures in Homer's poems as well as the causes for and effects of those actions and speeches. I shall argue, however, that the content of Homer's epics is insufficient as works of didactic poetry. I shall accomplish this first through a literary analysis of some of the passages that Havelock cites as particularly didactic. Then, by introducing the theories on orality and literacy posited by Giambattista Vico, I shall show that it is Havelock's very approach to the Homeric epics that prevents his theory from being a valid one. Vico provides a set of guidelines for analyzing ancient texts in a correct manner, and it will be shown that precisely because Havelock violates those guidelines, his theory on the didactic purpose of Homer's epics is not historically accurate. It is the historical shift from oral tradition to a written one that Homer's works represent that demands the guidelines Vico postulates, which Havelock does not abide by.

JUVENAL'S *SATIRES*: THE GOLDEN AGE, HISTORY, AND THE LAW

Matthew D. Hartig (Dr. Shannon Byrne-Cueva)

Department of Classics

This paper is concerned with Juvenal's vision of history as moral degeneration and, specifically, with this vision's influence upon the satirist's depiction of the Roman legal system. My thesis is that Juvenal's depiction of the Roman legal system in the *Satires* is shaped by this vision of history as gradual moral decline. In establishing this thesis, I first examine the images of the Golden Age, the socially mobile freedman, and the patron-client relationship, all of which illustrate the same vision of history exemplified in the satirist's legal references. I reference poems from Hesiod, Ovid, Horace, and Juvenal in my discussion of Golden Age imagery, and in my discussion of the Roman legal system I focus on Juvenal's *Satires*.

HERODOTUS AND THE SCYTHIANS: THE FACTS, THE FICTION, AND WHY

Anthony Mangione (Dr. Shannon-Byrne-Cueva)

Department of Classics

Herodotus, the first ancient Greek historian, does much more in his *Histories* than glorify the ancient Greeks. The Scythians, for example, are among the most peculiarly described peoples in the *Histories*. The Scythians differ from other civilizations Herodotus described in that they are from the northeast of Greece, located in modern day Ukraine, southwestern Russia, and western Kazakhstan. While cultures east of Greece were often considered bizarre, cultures north of Greece were seen as barbaric. The Scythians would have been very foreign to the Persians, Athens' most formidable enemy, even though the Scythians lived on the fringe of their empire. The ancient Athenian only came to know the Scythian people when they were recruited to police Athens. Often the subjects of jokes in the ancient theatre, the ancient Greek citizen knew little about the Scythians, except for their dress and broken Greek that he observed from these ancient policemen. Archaeological and anthropological studies support Herodotus' claims regarding the Scythians' nomadic lifestyle and other cultural practices, but only some of his information on certain Scythian religious practices, burial techniques, and indulgence in cannabis. This paper investigates the validity of such unsupported information, explores the reasons why the Scythians carried out these customs, and speculates on the reasons why Herodotus chose to present the Scythians in this light.

HISTORICAL SPARTA AND AMERICAN POPULAR CULTURE:

IDEALIZATION, MORALIZATION, AND MYTH

Paul Romolo (Dr. Shannon Byrne-Cueva)

HAB Program

This paper explores portrayals of Sparta both in ancient histories and in American popular culture. The historical authors investigated include Xenophon, Plutarch, and Herodotus, while the popular pieces include the film *300*, the History Channel special, "Last Stand of the 300," and Stephen Pressfield's novel, *Gates of Fire*. The result of this exploration is that popular culture draws upon idealization, moralization, and myth found in the ancient works. The result of this borrowing from the ancients is an exaggerated, hyper-real version of the Spartans. I establish this thesis by giving the contexts in which the histories were written, the things which they say, and how the contexts and facts influence the portrayals seen in American popular culture.

**CAN LOVE CONQUER ALL?:
THE ANCIENT AND MODERN FIGHT FOR A REVISION OF SEXUAL MORES
Marie E. Westerheide (Dr. Edmund Cueva)
Honors Program**

This work has two goals in mind. One goal of my thesis is to argue that both Longus, the author of *Daphnis and Chloe*, and Pope John Paul II, the author of *Theology of the Body*, were attempting to change the sexual behavior and morals of their particular society. Although the authors used two different genres appropriate to their social position, I suggest that both authors desired to use their literary work as teaching tools. In order to argue the idea that the *Theology of the Body* contains universal values or desires, this thesis asserts that some of John Paul II's ideas can be detected in Longus' *Daphnis and Chloe*.

**THE ECONOMICS OF THE MARKETPLACE OF IDEAS: FREEDOM
OF EXPRESSION FOR SALE
Brian Cantwell (Dr. Indra De Silva)
Department of Communication Arts**

The world stands today at the convergence of several global scale forces that have fundamentally changed the media industry. A simultaneous unprecedented wave of government deregulation concerning laws over media ownership and advances in communication technology have driven the free market toward massive global media conglomerates. The synergies or efficiencies gained by economies of scale has consolidated the industry into a handful of transnational corporations that own production, transmission, and distribution of TV, newspaper, magazines, movies, and books. What are the trends? What drives the industry? How do global media corporations make decisions about content? How does the internal corporate structure affect media's message? Has the commoditization of information fundamentally changed media? Previous research has begun to synthesize ideas that explore the fundamental economics behind the media industry. However dialogue concerning the media is not relegated to a strictly economic realm. Media are uniquely positioned as private enterprises with massive influence over the public political discussion and agenda. A vibrant and diverse media are arguably essential to democracy and the implications of consolidated media have practical, political consequences. The purpose of this research is to explore the potential external social cost to public discourse, press freedom, the concentrated power of information, and the democratic polity.

**THE ONLINE ILLUSION: CAN THE INTERNET SAVE THE PUBLIC SPHERE?
Matthew W. Krouse (Dr. Indra DeSilva)
Department of Communication Arts**

New forms of electronic media, such as *Facebook*, blogs, text messages, and chat rooms have become the new public sphere, especially for the millennial generation. They are praised as revitalized forums and means for the spread of ideas and establishment of relationships. Emphasizing efficiency and convenience, these new means of media and forums provide information and networking opportunities in a "cyber community" that seeks to replace the traditional town halls and public debates. However, it has become increasingly evident that while electronic media and technology have not eliminated community relations, they have established a public that is artificial in its sense of community, intimacy, and personal interaction. It appears that citizens are at risk of losing vital components of their social composition with increased dependence on media. Therefore, it is imperative to discover and acknowledge the consequences of media use. Personal interaction, character development, and democratic communities do not coalesce with the framework of this artificial *Public*. Without these ideals and values, the people threaten democracy and its role in our lives. A critical analysis of the social, psychological, and political effects of this new media must constructively evaluate media's role in society in order to preserve the ideals and practices synonymous with a health democracy. It is in this context that this paper will make an effort to demonstrate the value of face-to-face interaction in the intellectual and social growth of citizens and exhibit that current use of this new media contradicts with what has been expected in a democracy for centuries.

GOOD PROPAGANDA, BAD PROPAGANDA: MEDIA, DEMOCRACY, AND THE PUBLIC

Jessica Wabler (Dr. Indra DeSilva)

Department of Communication Arts

The German government's media strategy in WWII is one of the most-cited instances of government propaganda in history; its American and British counterparts, although not quite so frequently lauded, also incisively exercised media policies that formed the public's consciousness. Media, for each government, was a tool to be utilized in shaping people's minds. Their tactics, and even the structural formation of government-media relations, were actually quite similar, albeit enforced in very different ways. This comparison can be updated to hold relevancy in today's world, and the implications borne on democracy's validity are enormous. The standards for propaganda in democratic and totalitarian regimes are not as morally disparate as many believe them to be; in each, public opinion is a quantity to be manipulated and controlled. The exigencies of wartime only seem to exacerbate the government's fear of independent public opinion. Is the nature of civil government such that the public must be stage-managed through the media's marionette strings? There is ample evidence to attest that an internally divided country is considerably less secure on its external borders. "Dumbing down" the American public for the sake of national security is hardly justifiable, particularly in a democratic society, which is built upon the authenticity of the public's opinion. The extent to which democratic media tactics resemble those of totalitarian states – and the extent to which it is possible to change them without undermining the state – is the topic of this paper.

AMARTYA SEN: TAKING THE 'DISMAL' OUT OF THE 'DISMAL SCIENCE'

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The Harvard economist Amartya Sen has pushed the conventional boundaries of his field, forcing some economists to rethink how they approach developing world issues, such as poverty, famine, political development, and economic development. Taken as a whole, Sen's body of work powerfully argues that economists should jettison their faith in the utilitarian framework and pay greater attention to fairness of distribution, while also measuring welfare in terms of the needs and abilities of people, rather than merely in terms of aggregate measures of wealth. Unlike most of his contemporaries, Sen's work is interdisciplinary and comprehensive in scope, building upon philosophical and ethical foundations that modern economists typically have not considered. In fact, he has begun the monumental task of reuniting ethics with its prodigal son, modern economics. Most importantly, Sen's 'capabilities' approach breathes new life into the concept of freedom. He contends that economists' reliance upon a purely negative, rights-based conception of freedom both ignores the potential intrinsic value of freedom and does not account for the problem of structural inequalities that render impotent some rights. Sen would therefore advise adopting systems of welfare measurement that pay less attention to traditional measures of a nation's progress in development and economic well-being, and considerably more attention to each person's actual capability of enjoying rights and freedoms.

TESTIMONIAL LITERATURE: GIVING WITNESS TO ONE'S OWN LIFE STORY

Lauren V. Grove (Dr. Irene B. Hodgson)

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This thesis discusses two different Latin American testimonial narratives, *Me llamo Rigoberta Menchú y así me nació la conciencia*, the testimony of a Guatemalan woman Rigoberta Menchú, published by Elizabeth Burgos-Debray, and *Hasta no verte Jesús mío*, the testimony of a Mexican woman Josefina Bórquez, published by Elena Poniatowska. This thesis will examine what makes a testimony credible and successful and how each of these testimonies fits into those categories given the mediation by Burgos-Debray and Poniatowska and the controversy surrounding the content of the Menchú testimony.

**THE HEALTHCARE OF HISPANICS IN THE UNITED STATES WITH A FOCUS IN
CINCINNATI AND A COMPARISON TO THAT IN MEXICO ***

Michaela A. Maloney (Mrs. Maria Dolores Goddard)

Department of Modern Languages

The U.S. Hispanic population is growing four times faster than that of the general population, and healthcare organizations and providers are interacting with a greater number of Hispanic clients everyday. It is important that we as a society pay more attention to the quality of healthcare that the Hispanic population is receiving here in the United States because this population group is a part of our society, and their health in return reflects the health of our general public. There are a variety of barriers that Hispanics face when it comes to receiving adequate healthcare here in the United States, but there are two that stand out above the rest and they include the language barrier and the lack of education. Vast improvements can be made in both of these areas, but it has to begin with the healthcare organizations and providers. Despite the inadequacies that Hispanics face here, the healthcare they were once receiving in Mexico was and is far worse, which is one reason many seek residency and citizenship in the United States. They are merely seeking a better life, and for a country that believes in liberty and equality for all, it is time to embrace change, and offer Hispanics adequate healthcare.

* Also given as a poster presentation

SAY IT WITH PAVING STONES: THE FRENCH STUDENT REVOLT OF MAY 1968

Geoffrey R. Ralston (Dr. Jo Ann Recker, Mrs. Margaret McDiarmid)

Department of Modern Languages

The purpose of this work is to demonstrate the perplexity of the turbulent events of May 1968 and their profound impact upon French history. In France today, "before '68" and "after '68" have found their place as common parlance even though the student protests and the massive worker strikes that followed them are often misunderstood. In fact, though explanations regarding the origin of the violence and ferment of May 1968 often cite disillusionment with the post-war consumerist society and a rise in radical ideology, these arguments do little to explain why the entire country was so suddenly plunged into anarchy. The study explores the occupation of the Sorbonne in Paris, resulting in clashes between police security forces and students in the streets. Flaming barricades and thrown paving stones, or *pavés* – two quintessential elements of Parisian revolt – filled the city as communist and anarchist revolutionary groups worked to assert their authority over the disorganized masses. The public watched on in horror at the subsequent violence. Several workers unions, recognizing the opportunity to gain personal advantage, launched massive strikes that crippled the French economy and brought the country to a standstill, effectively overwhelming president Charles de Gaulle's government. However, though these events took place in a precipitous manner and the acting groups seemed to battle against the same authority, these groups in no way constituted a unified front and their timely action was merely coincidental. Nevertheless, May 1968 served as a transitory point for France in the shift from an industrial society to a modern, technological one.

PHILOSOPHY OF ALTERED STATES OF CONSCIOUSNESS

Michael Dieciuc, (Dr. Anthony Jensen)

Department of Philosophy

My paper discusses contemporary research done by Dr. Roland Griffiths and Dr. Charles Grob into the nature of mystical experiences. Both researchers sought to use the subjective effects of psilocybin: one sought to explore the experiential quality, while the other sought to use it as a therapeutic tool. My paper discusses the philosophical implications that this type of research provokes. My two conclusions are as follows: (1), an accurate account of consciousness can only be achieved multi-disciplinarily, i.e., no single discipline will have the final or fullest view of consciousness; and (2), consciousness is like a computer that requires multiple "programs" in order to engage the world effectively; in other words, consciousness does not operate under a single state and requires multiple states in order to interpret the world meaningfully. My paper blends and mixes disciplines in order to discuss both the psychological as well as the philosophical importance of the research into psilocybin.

FOURIER TRANSFORM SOFTWARE FOR PROJECTION OF IMAGES AND MOVIES

Kevin Novak (Dr. Heidrun Schmitzer)

Department of Physics

In our project, we attempted to use a laser beam and spatial light modulator to project detailed images and movies onto a wall. To that end, a program was developed that implemented a Fourier transform of images, and output them into separate image files which could be accessed and manipulated individually. The program has the additional desirable qualities of being able to view the imaginary and real components of the transform separately, both in their unaltered and logarithmically transformed state (a logarithmic transform is often applied to counteract the wide disparity in transform coefficients). Additionally, images of all file types (including .jpg) can be transformed, and the program runs in the Cygwin environment, making it operating system independent. Using the images created by the program, optical transforms such as high/low frequency filtering can be accomplished, as well as an analysis of the various frequencies in the original image.

WAR, PUBLIC APPROVAL, AND LEGISLATIVE SUCCESS: HOW DOES GEORGE W. BUSH COMPARE?

William Gorman (Dr. Mack D. Mariani)

Department of Political Science

This paper utilizes Congressional Quarterly's Presidential Success Scores to examine the effect of the Iraq War on President Bush's ability to implement his legislative agenda. The question becomes has diminished public support for the war undermined the president's ability to achieve his domestic and foreign policy priorities? Is there evidence to say that domestic issues and other priorities were "shunted aside" as a result of the public's negative views toward the war and the president? Through our analysis it has been indicated that war popularity does matter – popular wars do have a strong and positive effect on the ability of presidents to prevail in Congress. What is surprising is that unpopular wars also have a positive effect.

MEDITATION USING THE SCIENCE OF HEART RHYTHM*

Amy Sanders, Alanna Hultz, Katherine Haap, Abigail Colella, Amanda DeGraw, Sally Lutz, Allyson Berlon, Henry Link, Michael Johnson, Thomas Scanlon (Sr. Rosie Miller)

Department of Theology

The object of the HeartMath research project is to study the effects that meditation and heart coherence have on students stress levels and overall wellbeing. Heart coherence is the balance between your emotional, mental energy and your self-awareness (vital energy). When both mental and vital energy reach a reciprocal balance a person reaches a state of wellness. Ten Xavier undergraduate students participated in this research using the finger heart rhythm monitor. This is used to measure heart coherence at various levels interactively provided by Institute of HeartMath Freeze-Framer 2.0 computer program using different meditation techniques, resources and games. Each student had a minimum of nine sessions. The research project involves three components: 1) role of meditation and shift in consciousness and effects on the mind/body; 2) primary data of ten students in using the heart coherence program with their observations and hypothesis including research on the "science of the mind" and the "brain in the heart" and why it may work; 3) how heart coherence meditation can be a tool for stress reduction, better school performance, peacemaking and social change. Students will demonstrate the Freeze-Framer 2.0 computer program and research.

* Also given as a poster presentation